

AUTOMOTIVE INDUSTRIES

VOLUME 65

NOVEMBER 21, 1931

NUMBER 21

As the largest group user of automobiles and motor trucks, the farmer has a direct interest in highway development, gasoline tax diversions, Federal excise taxes, and vehicle regulation.

Those who seek legislation designed to restrict the economic use of the vehicle or to add to its cost will do well to evaluate the social and political influence exerted by the farmers before going too far.

Similarly, the motor car manufacturer has a responsibility here in studying the farm needs and building both his products and policies as closely as possible to meet the agricultural customer demand.

*Pyle Johnson, National Automobile
Chamber of Commerce, Washington, D. C.*

Farm Use of Cars and Trucks Doubles, Opening Wider Market

by Norman Damon

National Automobile Chamber of Commerce

FARM use of automotive equipment has more than doubled in the past decade.

Five million automobiles and motor trucks—a fifth of the total registered in the United States—and nearly a million tractors were in use on farms in 1930, according to final reports from the Farm Census of 1930.

Sixty per cent of all farms reported automobiles and about 14 per cent reported trucks.

Automobiles in use on farms practically doubled from 1920 to 1930, but the striking adaptation of the motor truck to farm use is revealed in the figure of more than 6 times as many trucks on farms in 1930 as in the earlier year. The national registration of automobiles during the decade about trebled, with motor trucks in use increasing by $3\frac{1}{2}$ times.

Six states actually reported more automobiles than farms. Nebraska leads the list with 91 per cent of all farms reporting automobiles and Iowa a close second with 90 per cent of all farms so equipped. Texas has

the distinction of leading in total number of automobiles with 300,176 of them on 280,758 farms out of a total of 495,489.

New York reported 58,974 motor trucks on 54,084 farms out of a total of 159,806.

Illinois leads in the use of tractors on farms with 69,628, on 66,172 farms. Iowa and Kansas follow closely with 66,000 each.

In its annual estimates of agricultural income the U. S. Department of Agriculture reported expenditures for machinery, including automobiles, trucks and tractors, at \$787,000,000 for 1930, this figure dropping from the high of \$981,000,000 in 1929.

The cost of operating automobiles, trucks and tractors, was fixed at \$508,000,000 for 1930, an increase of \$26,000,000 over the preceding year.

Roughly, machinery purchases declined 20 per cent in 1930 while gross cash income was estimated to have dropped about 23 per cent, from \$10,134,000,000 to \$7,824,000,000.

The influence of road surfaces on farm use of motor vehicles as evidenced by farm location was not measured until the Farm Census of 1925. Prior to that there was, of course, a marked increase in the surfacing of local roads.

Before—

"Farm relief" of a decade ago meant hard-surfaced roads.

Millions of dollars will be spent by Federal, state and county officials this year to put more farms on hard-surfaced roads + + + +



Figures from identical 28 states for 1925 show that progress has been made in the five year period, of from 1925 to 1930, largely in the betterment of the higher type surfaces (See Table I).

The average farm cash receipts in 1930, less cash outlay, were \$759, partly achieved, however, by a *decrease* in personal property of \$221. This compared with \$1,097 for 1929, with a net *increase* in personal property of \$201 or a total net of \$1,298 for that year compared with a total average net of \$538 for 1930.

Farm capital declined 10 per cent from 1929 to 1930.

The estimated rise in the ratio of business to pleasure use* of the automobile and a marked stepping up of the use of the motor truck are the most encouraging factors in the future of new farm business as well as a heavy volume of replacements.

An economic study of 941 automobiles on New York farms in 1928-1929 indicated an average annual operating cost of \$226, including depreciation, which represented 43 per cent of the total cost.

A total of 1168 farms were covered by the survey, 16 per cent of the farms having no automobiles; 80 per cent one car, 4 per cent two cars, while five farms had three cars and one had four.

This study revealed that half the use of the automobile was for farm business.

Approximately one-fifth of the cars were driven less than 2000 miles annually, approximately one-fourth were driven at least 6000 miles. About half were driven an annual mileage within this range.

The haulage of farm commodities by motor truck is on the increase. At the same time many commodities such as fertilizer, feed, equipment, and similar items are delivered direct to the farm by the distributor's trucks.

There are no data available as to the relation between wagon and truck use on the initial haul of farm commodities to shipping points, but with an increased mileage of hard-surfaced roads available all year it is probable that a large percentage of farm tonnage moves to rail and water shipping points and to market by truck.

While a little less than one-sixth of all farms are equipped with trucks there are a considerable number of cooperative trucks engaged in hauling milk, grain, truck crops, livestock, and other farm produce. This may be done either by one farmer hauling for his neighbors, by cooperative associations, or by contract

*U. S. Dept. of Agriculture estimated farm use of automobiles for pleasure purposes dropped from 75 per cent of total in 1919 to 60 per cent in 1930.

or common carrier haulers who pass the farm gate regularly.

In considering farm commodities by rank of importance as related to their transportation needs it is interesting to note in passing that wheat, sixth in importance, ranks first in rail freight revenue derived from agricultural products.

Milk, first in importance, now moves largely by highway, with the tank truck very much in favor. The economical limit to operation seems to be from 120 to 150 miles, depending somewhat upon roads and topography. Except for the largest cities, from 70 per cent to 95 per cent of the milk arrives by road from adjacent milk sheds.

Hogs, ranking second, move to market by motor truck at an increasing rate, the receipts at eight principal markets in 1930 amounting to 30 per cent of the total. Changes in jobbing practice through the establishment of small market centers have been factors in increased road haulage.

Cattle and calves trucked in to the same eight markets were about 19 per cent of the total receipts last year.

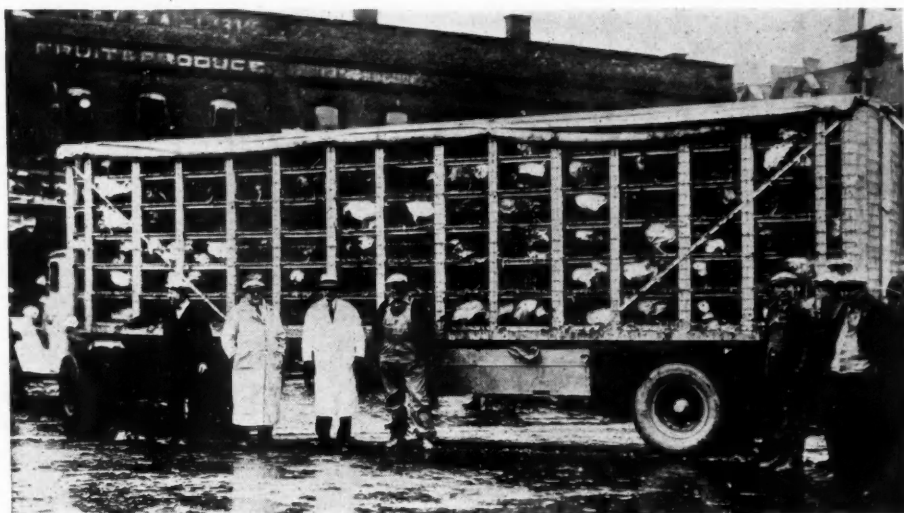
The entire shipments of fruits and vegetables by motor truck to market (beyond 20 miles) in the United States were estimated to have been between 14 per cent and 16 per cent, or from 150,000 to 200,000 car-load equivalents, in the one composite year of 1928-1929, according to the U. S. Department of Agriculture.

Surveys* of truck crop handling define farm motor truck transportation districts as (1) local and market

*The Marketing and Distribution of Fruits and Vegetables by Motor Truck, Technical Bulletin No. 272, U. S. Dept. of Agriculture.

Table I
Location of Farms by Type of Road
1930-1925

	1930		1925
Total farms	2,296,555		2,442,688
Location on:			
Concrete roads	82,964		59,037
Brick	1,953		.....
Asphalt	20,881	35%	..... 25%
Macadam	129,210		136,287
Gravel	571,747		418,950
Sand clay	36,532		.....
Improved dirt	484,660	23%	673,853 28%
Unimproved dirt ...	853,744		1,069,727
All others	114,864	42%	84,844 47%



and After!

This motor truck and good roads brought a South Dakota poultry farm 1500 miles nearer the ultimate consumer. The farmer has made his mediocre farm a highly profitable venture through this single effort

garden, (2) intermediate, and (3) long distance:

- (1) The local and market garden district embraces a territory of 5 to 15 miles from the market. Since little distribution within these districts was ever made by railroad, and the products usually do not go through the regular marketing channels, such territory is excluded from this study as much as possible. About some cities the use of the motor truck has caused an extension of market gardening to as far as 50 miles from the markets, but such local, intensive production is limited in western New York to about 15 miles from the cities. Fruits and vegetables in these districts are conveyed almost entirely by farmers in their own trucks and are sold in farmers' markets or peddled to retailers and consumers. At Buffalo a considerable quantity of market garden produce is sold by commission merchants.
- (2) The intermediate district extends from the market garden territory to about 75 miles from the market. Production in this district is extensive, with some attention to the needs of the nearby market. Usually about one-half of the motor truck movement is by farmers themselves, the movement decreasing as the distance from market increases.
- (3) The long-distance district, which is arbitrarily placed at greater than 75 miles from the market, is characterized by almost exclusive hauling by truckmen instead of by farmers.

The Ohio Department of Agriculture reports that the gradual development of high speed truck and expansion of hard surfaced highways are exerting a marked influence on methods of marketing and transportation. In the Columbus market this has resulted both in an increase in the arrivals by truck and in the area from which supplies are drawn.

During 1930, 58 Ohio counties and seven states outside Ohio furnished supplies in motor trucks, amounting to 10.3 per cent of total receipts. This represented 11,320 truck loads, 272 of them from other

states. The average net weight per truck was 1788 lb. and the average one-way haul per truck was 27 miles.

"Refrigeration," the department states, "may in the near future expand even further the territory furnishing supplies in trucks on so-called 'local' markets such as Columbus."

The area within which roadside markets may be profitably operated around consuming centers has been expanded by improved roads from a distance of 10 to 15 miles to 25, 30, and sometimes as high as 50 miles, particularly on heavily traveled, through routes.

The outlet provided by the roadside market has also widened the scope of produce offered in that the production of adjacent farms may be combined for sale under one management.

Last year nearly 1,500,000 school children were carried to 16,500 schools by 48,775 buses over 451,000 miles of highway. Thus improved educational facilities for farm children have been made available through improved highway communication.

The motor vehicle is an essential piece of farm equipment today. Many owners have wholly discarded light horses and vehicles for road travel. Then the increased expenditure for motor vehicle operation, the correlation between a large automobile registration and high income and farm value would seem to add further proof.

Dr. T. C. Atkeson, while Washington representative of the National Grange in 1926, expressed this thought before the Interstate Commerce Commission in a hearing on Docket 18,300:

"The people on the farms of the United States are concerned about the building of highways and their use in highway transport for both economic and sociological reasons. This is a consideration which is of national importance, for without this opportunity for freedom of movement, that is, equal transportation facilities, American men and women can no longer be expected to remain on the farms."

Perhaps, however, one of the most important reasons for a continued and widened use of the motor vehicle by the agricultural population rests in a sound philosophy which looks upon the motor vehicle as taking the place of the horse and wagon of yesterday.

(See Tables on Pages 810-811)

Table II
Farm Registration of Motor Vehicles

	1930	1920
Total farms	6,288,648	6,448,343
Automobiles	4,134,685	2,146,362
Number of farms reporting ...	3,650,003	1,973,564
Motor trucks	900,385	139,169
Number of farms reporting ...	845,335	131,551
Tractors	920,395	246,083
Number of farms reporting ...	851,457	229,332

Welding of Frames May Introduce

DURING the past year something like \$200,000 has been spent in the automotive industry in investigating the possibility of welding chassis frames instead of riveting them. While no company apparently has advanced sufficiently far to contemplate immediate production of completely welded frames, the interest taken in the subject warrants a discussion of its future possibilities.

If frames are to be welded the problem may be attacked along two different lines, as follows:

1. Replacement of riveting by welding in a frame of conventional design.
2. Research on new frame designs specially adapted to welding.

Practically all companies that have done experimental work on welded frames have followed the first plan, and the results have not been very satisfactory. The engineering departments of a few companies have been considering the second plan, but generally they have been handicapped by lack of knowledge of the fundamentals involved. It appears at present that frame welding in 1932 passenger-car models will be limited to a cross-member here or there for greater rigidity.

Most of the interest in frame welding at the present time centers around the subject of rigidity, although there are other considerations also. The objects generally aimed at may be listed as follows:

1. A more rigid joint between conventional side- and cross-members.
2. A more rigid frame structure by departures from

A completely welded frame cannot be achieved without further fundamental data. Who will furnish them? + +

conventional cross-member design permitted by welding.

3. Reduction in the cost of material due to welding a conventional frame.
4. Reduction in the cost of material due to adapting frame design to welding (unconventional frame).
5. Increased rigidity at no extra cost for material, or equal over-all rigidity with less material.
6. Increased rigidity due to complete alteration of frame design or in frame parts production.
7. Economy of welding as compared with riveting.
8. Reduction of internal stresses in frames set up during assembly as a result of inaccurate size control of cross-members, etc.
9. Possibility of accurately controlling the rigidity characteristics of the frame structure.

No attempt has been made here to list the items in the order of their importance.

Opinion based on the experiments of different companies is far from unanimous that the mere substitution of welding for riveting produces increases rigidity. There is also a difference of opinion as to whether such an increase in rigidity would prove desirable. Some typical experiences may be cited:

Company A substituted arc welding for riveting. No apparent gain in rigidity resulted. Side rails in this frame were rather heavy, cross-members fairly light.

Company B substituted spot and arc welding for riveting. Torsional tests of the frame alone indicated an increase in rigidity. With the body mounted, however, there was apparently a decrease in total rigidity.

Company C substituted butt and arc welding for riveting. There was a con-

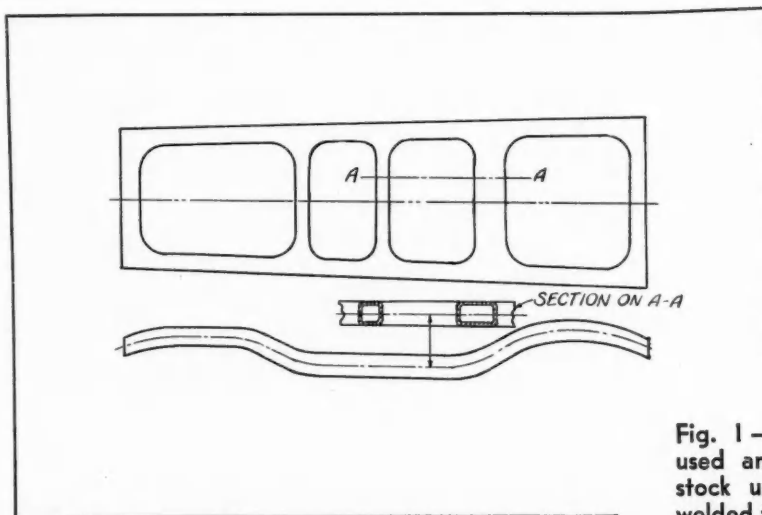
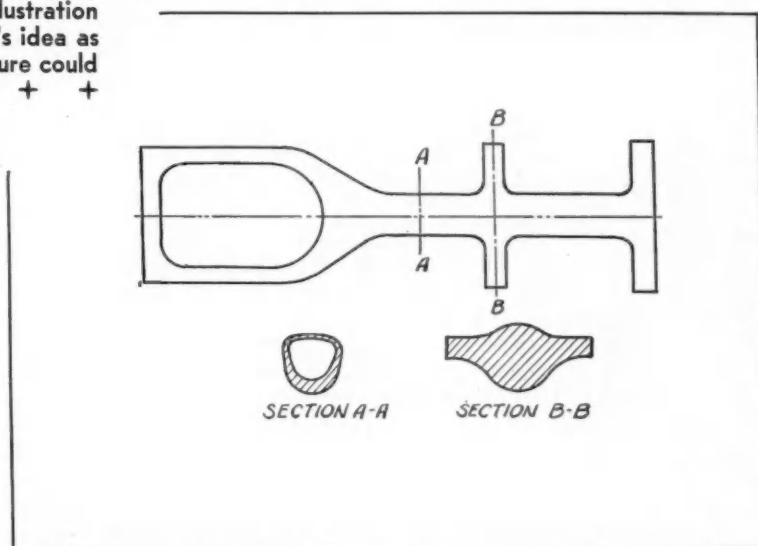


Fig. 1 — Thinner stock might be used and stamped out of sheet stock using only two stampings welded together in a complete box at the horizontal center line of the material + + + + +

Greater Chassis Rigidity and Effect Production Economies

by
Athel F.
Denham

Fig. 2—The total elimination of side rails might simplify the problem. This illustration shows one engineer's idea as to how such a structure could be achieved + + +



siderable gain in rigidity both of the frame alone and of the whole car. However, when subjected to road tests frame breakage almost immediately followed.

While the types of welding used are mentioned here, it does not necessarily follow that the types of welds bear a definite relationship to the results that may be expected.

These experiences show that the result of experiments on one specific design cannot be applied directly to other designs. For instance, it is quite probable that in the frames of Company A, the riveted joints were excessively rigid as compared with the frame as a whole, so that what flexure occurred was in the cross-members themselves. It is also possible that inexperienced welders or inadequate equipment produced a weakened joint, either through a poor weld or through weakening of adjacent frame sections.

In the case of Company B, the results suggest that welding itself produced a more rigid joint between cross-members and side rails, thus shifting the weakest or most flexible points to other parts of the frame, which bear a more vital relation to the body.

The writer believes that this affords further support for the contention made in these columns some time ago that improvements in frame design can be achieved only when considered in relationship to the car as a whole.

In the case of Company C a decidedly different picture presents itself. Here, evidently, the frame flexed mainly at the riveted joints. When judged on the basis of the usual frame tests, the original frame was quite satisfactory from a rigidity standpoint.

However, when the frame was welded the strength of the joints was materially increased—and this increased the normal stresses at other points of the frame sufficiently to cause breakage. On paper the riveted structure apparently was just as rigid at the joints, if not more rigid. Assuming that overstressing of the

frame did not occur as the result of welding, the conclusion is logical that some "give" was present in the riveted joints.

Although many engineers decry the belief that there is a slight motion under the rivet heads in even the most poorly riveted frames today, they do admit the possibility of flexure in the material around the rivet. This motion, however slight, may prevent frame breakage in many cases.

The experience of manufacturers who have attempted to weld conventional frames inevitably strengthens the belief that a certain amount of flexibility in the frame structure is necessary. Whether there should be a uniform distribution of "flexibility" or whether it is more a matter of purposely and definitely selecting the sections or joints which are to "give" to prevent breakage is an open question.

Departure in cross-member structure not easily feasible with riveted structures, but possible with welding is a step which one or two manufacturers will probably take on their 1932 cars. This is not as much of a problem as if the whole frame were to be welded. Complete box section cross-members, or tubular members flaring into bell-mouths stamped into the side channel web, are examples. When used at critical points in the frame structure they would most likely increase the rigidity at that section, transferring such flexure as occurs to parts of the frame bearing a less vital relationship to the rigidity characteristics of the car as a whole.

During the past year about \$200,000 has been spent in investigating the possibility of welding chassis frames instead of riveting them + +

Leaving the question of rigidity for the minute, let us consider the economies of the proposition. Some material may be saved in a welded frame by the elimination of overlapping joints, gusset plates, etc. A greater saving may be effected by the use of lighter side rail stock in the welded frame, theoretically without loss of rigidity.

The thinness of frame stock used today is largely limited by the ability of the material to carry the rivets, with their localized stresses. Welding, properly applied, might result in better distribution of these stresses at the joint, especially if arc, butt, or flash welding were used. From this particular angle, spot or projection welding does not appear to offer as much promise, although the writer believes there is a definite place for even these types of welds in a frame structure if welding were to be substituted for riveting throughout.

Just how much the saving in material might amount to would depend largely on the individual frame. Some time ago the sales cost of frames was made up (on the average) of about 70 per cent material cost and 30 per cent labor, profit and overhead. This proportion may have changed somewhat of late, owing to lower material costs, but improvements in press and riveting equipment have reduced labor charges and offset the decreased material prices, so that material still represents by far the major part of frame cost in large runs.

It is, of course, entirely possible that there would be no saving in material used. For instance, a manufacturer might take advantage of the possibility of using thinner stock in the side rails, to extend the depth of the web for increased rigidity. Again if frames were completely redesigned to obtain the maximum rigidity benefit from welding, there might be even an increased material cost. An example might be a frame stamped out of sheet stock, using only two stampings, welded together in a complete box form at the horizontal centerline of the material. Here there would evidently be considerable waste of material, where sections are stamped out of the frame sheets to provide clearance for the various chassis units, and for reduced weight. Where such sections are stamped out, of course, the inner edge would be turned down in the upper panel and up in the lower panel for welding together to form the box section. This is illustrated by Fig. 1.

Again, the adoption of welding may lead to rather radical departures in frame designs when sufficient knowledge of the fundamentals has been obtained. For instance, there is a rather widespread desire among engineers to experiment with the back-bone type of frame. A few years ago body designers were arguing for greater frame width—wider spacing between side-rails. The industry followed. Today the body engineer knows that the idea has a sufficient number of disadvantages to offset possible gains, and in many cases an about-face has been made in the hope that

the total elimination of side rails, particularly at the center and rear, might simplify the body maker's problems of body deflection.

Riveted structures do not appear to lend themselves as readily to this type of frame as welding does. Fig. 2 shows one engineer's idea as to how such a structure might be achieved.

The center section at the rear is of the banjo type, inclosing the propeller shaft, while the horizontal extensions are for the purpose of carrying the springs, assuming the continuance of the use of semi-elliptics.

Whether or not the mere substitution of welding equipment for riveting machines would result in economies of manufacture appears to depend largely on the type of design adopted. Aside from the cost of welding equipment and the direct labor comparisons between welding and riveting alone, study of the economics of welding would have to include such items as material handling cost and parts production costs. A welded frame might easily be set up in a single jig, as is done in the case of airplane fuselages, and welded in one set-up, possibly resulting in lowered floor space requirements.

Item eight has been listed here merely to introduce one of the objections frequently made to frame welding that welding of cross-members to side rails may result in building up larger internal stresses in the frame than riveting, for a given variation in length of cross-members. This objection, the writer believes, does not hold, as it presupposes mere substitution of welding for riveting without corresponding changes in design. It is perfectly obvious that even if overlapping joints are used, welding allows for greater flexibility in parts size control, since it is no longer necessary to match up rivet holes. If overlapping joints are not used, internal stresses in the frame must be relieved providing flexibility at proper points.

This latter possibility seems to hold much promise, theoretically, but it is difficult to realize. To achieve the proper distribution of rigidity and flexibility in a given frame requires not only a far greater cooperation between frame, chassis, and body manufacturers than there has been heretofore, but also a further knowledge of the fundamentals of frame design, especially in relation to body structure.

If welding is to be adopted, a further element of cooperation must be introduced—that of welding-equipment manufacturers.

The status of welding experiments to date shows little evidence of cooperative effort. Car manufacturers have been carrying the idea along almost entirely by themselves. Frame manufacturers also have carried on some work along these lines, while the welding equipment people have a fund of fundamental knowledge gained from their experience in structural work; buildings, bridges, railroad freight cars, etc.

(Turn to page 798, please)

Automotive Men and Companies Playing Vital Part in Unemployment Relief

Through individual plant and community activities the industry's leaders have, practically to a man, put their shoulders to the wheel + + + + +

LIKE an automotive roll of honor reads the list of executives in this largest manufacturing industry already contributing to or actively participating in the stupendous unemployment relief work being carried on throughout the country in preparation for the rigors of a winter which so far has been mercifully late in arriving.

With a multitude of detailed reports missing from many towns, sufficient quantities of material have already poured in as a result of a survey just undertaken by *Automotive Industries* to show clearly the vital, moving part which is being played by automotive men in forwarding local unemployment relief work.

The automotive industry is doing its share in this great work by participating in local community activities, thus falling in line with the general program outlined by the President's Organization on Unemployment Relief. The whole problem was given study from a specific automotive standpoint several months ago through the agency of a committee appointed by the National Automobile Chamber of Commerce. This committee was headed by A. R. Erskine, president, Studebaker Corp., and had as members L. A. Miller, president, Willys-Overland Corp., and Robert W. Woodruff, chairman of the board, White Motor Co. Important among the recommendations of that committee which were received with approval by the membership of the chamber were: (1) That employment should be spread out as far as possible, giving part time work to as great a number of individuals as possible; (2) that parts be manufactured for stock if necessary to provide some extra employment throughout the winter months.

Since that time a definite attempt to follow out these recommendations has been made and is being made in many automotive plants, even though the greatest efficiency of operation has to be sacrificed in many instances to do so.

Vigorous Efforts to Relieve

The carrying out of these and other relief measures, however, is being accomplished by automotive men through their own individual plants and through local community activities in their different cities and towns.

While no complete report of the activities of automotive men will ever be available, enough specific activity can already be found to illustrate clearly the vigor and fullness with which representatives of our industry are plunging into the unemployment relief work.

Thus in South Bend, for example, we find A. R. Erskine proposing, organizing and carrying on as

president of a committee of 100, the purpose of which is to supplement and coordinate the work of the various charitable agencies of the community. I. J. Reuter, president of Oakland, is heading up relief work in Pontiac. In Pontiac, too, C. B. Stiffler, assistant to Mr. Reuter, is one of three men who have consented to serve as members of the County Poor Commission at a salary of \$10 a year, the other two being A. R. Glancy, former Oakland president, and C. B. Wilson, former president of Wilson Foundry & Machine Co. It is proposed completely to reorganize the county's present plan of poor relief in order that taxpayers may be saved as much expense as possible and at the same time take care of its tremendous poor problem. Charles Barth, former Chevrolet vice-president, is heading the industrial solicitation division in the \$400,000 relief drive being carried on in Flint in November.

Automotive Men Are Actively Serving

In Detroit itself, automotive men are serving actively in unemployment relief work in various capacities. On a committee working to raise \$5,000,000 for the purpose of serving free lunches to poor children in Detroit are to be found such important automotive names as C. S. Mott, vice-president of General Motors; H. W. Peters, vice-president in charge of sales, Packard; Fred M. Zeder, vice-president in charge of engineering, Chrysler, and Clarence W. Avery, president of Murray Body Corp.

Nearly every prominent company and individual in our industry in Detroit is found among the list of important contributors to the Detroit Community Fund. Among the larger contributors whose donations have been made public are:

Briggs Mfg. Co., \$12,000; Budd Wheel Co., \$5,000; Chrysler Corp., \$25,000; Mr. and Mrs. James Couzens, \$120,000; Mr. and Mrs. Hugh Dillman of Dodge Bros., \$15,000; Mr. and Mrs. Fred Fisher, Mr. and Mrs. Charles T. Fisher, Mr. and Mrs. William A. Fisher, Lawrence Fisher, Mr. and Mrs. Edwin F. Fisher, Mr. and Mrs. Alfred J. Fisher, all of the General Motors and Fisher Body Corp., jointly, \$125,000; Mr. and Mrs. Edsel B. Ford, \$130,000; Gemmer Manufacturing Co., \$2,100; Graham-Paige Motors Corp., \$5,000; Hoskins Manufacturing Co., \$2,600; Mr. and Mrs. Henry B. Joy, formerly of the Packard Motor Co., \$15,000; McCord Radiator & Manufacturing Co., \$2,250; Packard Motor Car Co., \$35,000; American Car & Foundry Co., \$815; Briggs Manufacturing Co., \$8,559; Cadillac Motor Car Co., Clark Street plant,

(Turn to page 817, please)

Spend Engineers' Time for Profit

AUTOMOTIVE engineers don't spend enough time out in contact with their customers.

We make this statement without qualification, not merely because it's been our own opinion for quite some time, but because within recent weeks it has been pronounced publicly and vehemently by important automotive men who know a lot more about the matter than we do.

John A. C. Warner, general manager of the S.A.E., himself an engineer with a fine record of technical achievement to his credit, has said so. T. L. Preble, sales manager of the Pierce-Arrow division of the S.P.A. Truck Corp., who for years has been successfully marketing products designed by engineers, has said so. F. C. Horner, General Motors Corporation's transportation expert, has said so. And we've heard plenty of other executives say so in private.

Field Contacts Must Be Compulsory

THE gist of these three publicly made criticisms runs along much the same lines. "It should be compulsory," John Warner told the Metropolitan Section of the S.A.E. a few weeks ago, "for engineering and production executives to spend a sizable portion of their time in direct contact with field conditions . . . Lacking field contacts our technical men cannot be expected to look beyond the blueprints into the prospect's pocketbook."

Preble strummed the same chord when he stated at the S.A.E. Transportation meeting

in Washington only a few weeks later that: "It is incumbent upon the manufacturer to insist upon his engineers spending more *personal* time with motor vehicle buyers, both large and small . . . Too often does the manufacturer's designing engineer cloister himself in his own office and depend upon his examination of competitor's specifications and his conversations with his own personnel instead of personally exposing himself to the man who ultimately pays his salary—the customer."

And Mr. Horner backed Mr. Preble up at the same meeting by saying: "Lots of manufacturers would be better off if their designing engineers spent more time in the field than in the office. No question that they can learn a lot from the scientifically operated fleets."

Another speaker at the same meeting supported this viewpoint and laid the lack of field contact to laziness on the part of engineers.

The Engineer Is Not Lazy

SINCE this question seems on its way to a great deal of discussion, it is only fair to the designing engineers that it be examined from a broad and not a narrow viewpoint. It is safe to start off with the premise that the whole operation of design-

ing, building and operating a motor vehicle probably would be benefited by a closer liaison between the designing engineer and the user. Hardly anybody will deny that—even the designing engineers themselves.

But having stated that premise, it is not a necessary corollary that the individual engineer is lazy, pigheaded or narrow-minded when he does not spend a great deal of time in field contacts.

He Must Have Real Cooperation

IF the average designing engineer is to multiply his customer contacts manifold, more than a mere desire on his part to do so is needed. Among other things, the following:

1. Desire on the part of his company's chief executive to have him multiply customer contacts.
2. Budget large enough to provide for additional traveling expenses and for enough capable assistants to carry on routine work while the engineering Marco Polo is out discovering his new worlds.
3. A definite, organized schedule for field trips; just as definite as that which the sales department makes for

JUST AMONG

OURSELVES

the holding of dealer meetings.

4. A definite, previously worked out plan for conducting the field investigations and contacts once he gets out on the road.
5. Determination to approach the field contact work in the same spirit of scientific inquiry that he would approach a research problem—without predetermined ideas of what the investigation should or should not develop.
6. Probably some training and perhaps some assistance in the practical technique of making field contacts.

Emotional Discomfort

TAKING the last point first, it is worth recognizing the fact that many engineers involuntarily shun field work because of the purely emotional discomfort which comes to them at the thought of breaking in on strangers, starting a conversation and getting a "cold" contact under way. How terrifically important this one element actually is in causing the average engineer to avoid customer and trade contacts never will nor never can be known accurately. It is quite conceivable, however, that it is at the root of much rationalizing

on the subject by design engineers themselves, that it is the underlying cause in many instances, the actual reasons given by the engineer himself being largely defense mechanism built up to prevent the piercing of this psychological soft spot. And the more "hard-boiled" the particular engineer may appear, the more likely is it that this is the case.

Critics Fail to Realize

MOST critics of the engineer fail to sense this important possibility, particularly salesmen-critics. Bursting in on "cold" leads; making conversation with strangers; being friendly with acquaintances—these things are just routine with them. They do them as naturally, as comfortably and as eagerly as the engineer pores over a blueprint or a research experiment. Ask the salesman to concentrate hour after hour on a single, specific detail of a definite subject and he will be just as emotionally uncomfortable as is the engineer when he is asked to "go out and contact the customer."

Can the Engineer Be Changed?

RECOGNITION of these psychological differences is the

first step toward progress with this problem. Can the engineer be changed?

If by that is meant "Can the engineer be made to enjoy the sales type of contact?" the answer probably is "No"—at least in a majority of cases. But with a clear understanding of the emotional elements involved, it is quite possible to get the engineer into contact with the customer and materially improve his efforts in this regard.

In the early stages, it may be necessary or desirable for the engineer's contacts to be made in conjunction with some one from the sales department; some one tactful enough to help break the ice and yet retire to the background of the conversation once he's got it under way. Some one competent, not only to smooth the way conversationally, but also to center the talk around the points which the engineer needs to develop.

A regular schedule of calls, rigidly adhered to in spite of hell and high water, will be a big help in overcoming this emotional antagonism to contact, too. Because every succeeding call after the first one becomes easier and easier; more and more comfortable. Almost any salesman who looks back on the very first calls he made as a cub will bear out this contention. Use doth breed habit in a man today just as it always did. A definite schedule consistently adhered to insures sufficient use to breed habit eventually.

All of which means that the engineer who has not been making many field contacts in the past will profit much more from the fiftieth customer call that he makes in accordance with his new plan than from the first.—N.G.S.

Renewable Valve Seats Cut Eliminating Necessity for

Heavy-duty engine builders have developed seats of composite construction being made of carbon steel and special heat-resisting alloys

UP to a few years ago no serious trouble was experienced with passenger-car and truck engines from inadequate life of the valve seats. Of course, the valves required "grinding in" at intervals, but as long as these were not too short, this did not appear to be a serious matter, especially in view of the fact that the combustion chambers of engines had to be decarbonized periodically, and usually valve grinding and decarbonizing were effected at the same time.

Recently, however, there have been changes in the conditions of operation of commercial vehicle engines, with the result that both the heat stresses and the mechanical stresses on the valve seats have materially increased. Even where alloy iron cylinder castings are used the life of valve seats often is entirely too short, and this has led engineers to look for a remedy.

What usually happens is that the valve seat erodes

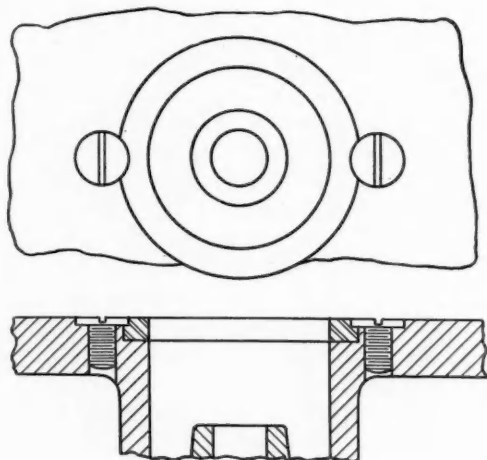
or wears away, so that the valve sinks deeper into the block, and the clearance between the valve stem and plunger is diminished. This clearance must be maintained at such a value that there is no possibility of it being taken up completely when the engine works continuously under full load, for if this should occur, there would be "blow-by" of the burning gases past the

valve head when ignition takes place, and even the best valve material cannot stand such "blow-by" for any length of time. To prevent the possibility of "blow-by," the valves must be adjusted frequently, and such adjustments are apt to become onerous.

The question arises as to why there should be more wear and erosion in modern commercial vehicle engines than in the engines of an earlier period. In this connection it must be remembered that the high-speed commercial vehicle, capable of maintaining a passenger-car pace, is a comparatively recent creation. To obtain the high power necessary for such speeds from engines of moderate size and weight, speeds of revolution have had to be increased greatly. Where only six or seven years ago truck engine speeds ranged between 1200 and 1500 r.p.m., speeds of over 2000 r.p.m. are common now. Compression ratios also have been increased somewhat. It is true that an increase in compression ratio does not result directly in an increase in engine temperature—rather the contrary. But if the compression is carried too high, the engine is likely to knock, and it is well known that when an engine knocks, its working temperature rises and the power output is decreased. Finally, the average power factor at which truck and bus engines operate is undoubtedly considerably higher today than it was ten years ago. This is due to the improvement in roads and the laying out of new main roads in such a manner that top speeds can be maintained for many miles without let-up.

The most pronounced tendency in truck engine design in recent years has been toward higher operating speeds, and a limit now seems to be set to further development in this direction by the limitations of exhaust valve seats. Bearings, it appears, can be designed to take care of the loads on them at still higher speeds, especially if counterweights are applied to the crankshaft arms to reduce the main-bearing loads. The highest specific bearing load is taken by the piston pin, but the capacity of this bearing can be further increased by providing pressure lubrication for it, as is now being increasingly done.

Inserted valve seats of a harder and more heat-re-



This sketch of the Mack construction shows the shrunk-in seats to be held by headed screws + +

Maintenance Costs by Periodic Regrinding

by
P. M.
Heldt

sistant metal than the cylinder or head casting are no novelty, for they have long been used in aircraft engines with aluminum cylinders or cylinder heads. The experience there gained, however, could not be applied directly in the case of iron cylinders, for one of the requirements is that the metal of the insert must have substantially the same coefficient of heat expansion as the metal of the block itself. In aluminum cylinders the valve seats are usually made of aluminum bronze, an alloy containing about 90 per cent copper and 10 per cent aluminum.

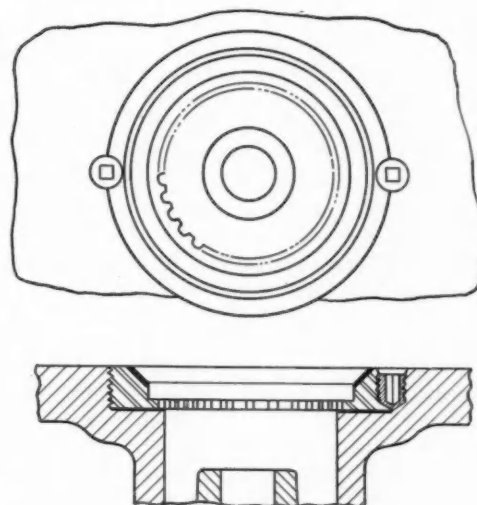
The usual practice in aircraft engines with aluminum cylinder heads and inserted valve seats of aluminum bronze is to turn the valve seat, which is in the form of an annular ring, a few thousandths of an inch larger in outside diameter than the diameter of the counterbore in the head, and then force the seat into place. However, with blocks of cast iron this plan does not give satisfactory results. Aluminum bronze has a coefficient of heat expansion which is about twice as great as that of cast iron, and if an aluminum-bronze ring were forced into cast iron with a shrink fit, a crushing action would take place the first time the engine was heated up. This would loosen the ring and result in poor contact between it and the block, with consequent poor heat conduction.

A valve insert must meet two other requirements besides having about the same coefficient of heat expansion as the metal of the block, although these two are closely related: it must be able to withstand high temperatures and it must not soften materially at high temperatures. It is also generally considered advantageous to have the seat of a different material from that of the valve itself, although in light-duty engines cast iron valve heads on cast iron seats give good results.

Many alloys have been developed in recent years which have the property of maintaining a considerable degree of hardness up to quite high temperatures. Such alloys are used largely for metal-cutting purposes (high-speed steel, etc.) and for the exhaust valves of heavy-duty internal combustion engines. Among the principal constituents of these alloys are tungsten, silicon, chromium, and cobalt. The use of these alloys for valve seats presents difficulties, however, because of their lack of machining qualities.

Aside from the material for the removable valve seats the method of securing them in the block presents quite a problem. The joint between the seat and the block must be secure so that the seat cannot loosen in service, and there must also be metallic contact over a large area, so that the heat absorbed by the valve

head through its contact with the burning gases (most of which is transmitted to the block through the valve seat) may have an easy path of flow. If the inserted seat has about the same coefficient of heat expansion as the block material, a good path for heat flow can be obtained by making the seat a shrink fit in the counterbore, for the area of contact between valve seat and block is much larger than that between valve head and seat, and the former is permanent, whereas the valve is on its seat less than three-fourths of the time the engine is in operation. Some manufacturers consider it advantageous, however, to screw the seat into the counterbore in the block. If the threads are carefully cut, this evidently increases the area of contact, and therefore should decrease the resistance to heat flow. In aircraft engines with inserted valve seats it is common practice to slightly peen over the edge of the counterbore, to help hold the separate valve seat in place. In commercial-vehicle engines, on the other



In White heavy-duty engines the renewable seats are screwed into the block and locked by set screws

hand, the practice of securing the seat by means of clamping screws or locking screws has come into use. It seems that the manufacturers of these engines contemplate the renewal of the valve seats during the life of the engine, and a seat naturally is more easily replaced if it is secured by means of a screw than when it is held in place by a peening process.

Among the pioneers in the adoption of renewable valve seats in commercial vehicle engines was the International Motor Co., manufacturer of Mack trucks and buses. Its practice in this respect was partly described in the October issue of the S.A.E. Journal by Edward M. Getzoff, mechanical engineer of the Plainfield, N. J., engine-testing laboratory of the company. It is understood that owing to a pending patent application the details of construction cannot as yet be fully disclosed.

Mack Seats Made of Special Alloy

It is stated that in the production of the valve seats, use is made of a commercial alloy containing a high percentage of tungsten, and of soft steel, an annular ring produced from this combination being forced into a counterbore in the block under pressure. The ring or seat is held in position by two screws with flat cylindrical heads, located at opposite ends of a diameter. The alloy is of such hardness that it cannot be machined, but must be ground. However, the seats are ground on the seating surface—which in Mack valves is flat—in the course of production, and if the counterbore is carefully made it is not necessary to regrind the seats after they have been inserted in the block.

The following results of tests made on an engine equipped with these valve seats are given by Mr. Getzoff: The carburetor was set to give a mixture of such leanness that the power output under full throttle was 10 per cent below maximum. The engine was run at wide-open throttle for 50 min. at 400 r.p.m. above the governed engine-speed. During this period the jacket cooling-water was permitted to boil. At the end of the 50 min., the engine was idled immediately and the jacket cooling-water was reduced in temperature as rapidly as possible. At the end of the 10 min., during which time the cylinder-block was thoroughly cooled, the speed was raised immediately to the peak-power speed for another 50-min. period as described above. This cycle of operation was repeated every hour.

One engine was subjected to 700 hours of testing at 400 r.p.m. above the governed speed, with an average total decrease in valve clearance of 0.003 in. Other models of Mack engines were tested for periods ranging from 300 to 500 hr. of operation at 400 r.p.m. above the governed speed, with average valve-clearance changes of 0.000 to 0.002 in. With the valve seating directly on cast iron the erosion or sinking in of the valve amounts to about 0.012 in. in 500 hours of operation under the conditions described.

White Solves its Problems

The White Co. uses inserted exhaust-valve seats in its latest bus engine, the 5-A. In Stellite, a non-ferrous alloy used for cutting tools, a material was found which meets the requirements made of valve seats for heavy-duty engines. The use of this material was surrounded with difficulties, however, owing to its great hardness, which makes it impossible to machine it. The construction illustrated by Fig. 2 was finally developed and is said to have given complete satisfaction.

A ring of machine steel is made which can be screwed into the block and then locked in position by means of set screws. The ring is beveled, and Stellite is welded to this beveled surface of the valve ring. After welding, the welded seat is rough-ground and the steel ring is screw-threaded on the outside and provided with serrations on the inside, for the insertion of a tool by means of which it can be screwed into the block. The threads are brushed with a solution which is said to assist in obtaining a good bond between the block and the seat, thus not only preventing the seat from coming loose, but also improving the path for heat flow. A thin washer of soft iron is placed between the valve seat and the bottom of the counterbore, and the seat is locked in place by set screws or dowels on opposite sides, which are half in the seats and half in the block.

After the seat has been thus secured in the block, its seating surface is finished by means of a high-speed grinding wheel in a grinder that is held concentric with the valve-stem guide. This operation is sufficiently accurate so that no "grinding in" of the valve in its seat is required. The clearance allowed between the valve stem and guide is limited to 0.007 in., and the tolerances on the valve seats are held very close.

Considerable development work was required in connection with the welding process used for the seats. Welding is effected automatically, the table holding the work being fed by electric power to insure uniform welding speed. In addition, it was necessary to develop fixtures for holding the work, cores for controlling the flow of welding heat, etc.

Inserted Valve Seats Tested

We are informed that these inserted valve seats have been thoroughly tested and have proved to be entirely satisfactory. The largest engine of the White line, the 5-A, was run the equivalent of thousands of miles under full load, and after from 40,000 to 50,000 miles of service there was no need for regrinding or refinishing of the valves.

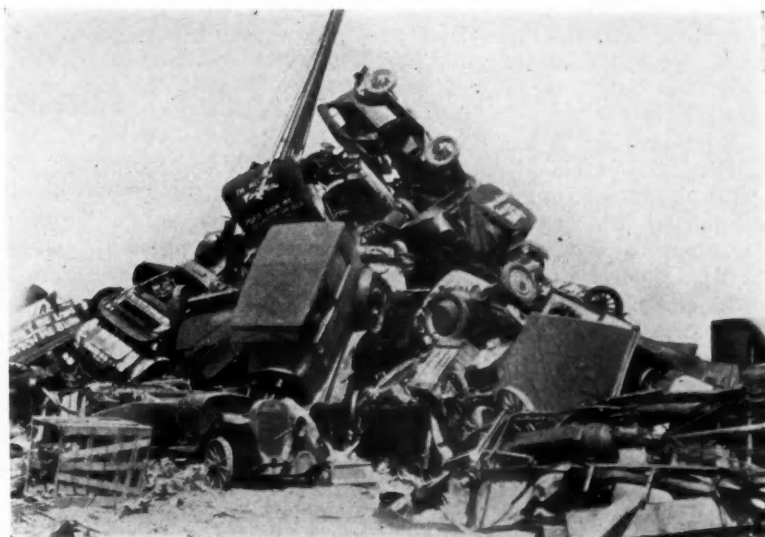
Valve-seat inserts of high-speed tool steel are used in the truck and bus engines of Dodge Brothers Corp. It is claimed for these inserts that when they are used together with exhaust valves of non-burning, non-oxidizing and non-warping steel, and a valve-stem guide of high-nickel cast iron, they will give 50,000 miles of service without valve adjustment or valve grinding, and it is believed that the life of the exhaust valves will equal that of the cylinder block itself.

The insert, which is made of a steel alloyed with tungsten, chromium and vanadium, is turned to a diameter 0.004 in. larger than that of the counterbore in the valve pocket, and is pressed into place by a special machine which also turns over the metal of the block around the edge of the insert.

As evidence that the new exhaust valve insert solves the problem, the Dodge firm points to the experience of a trucking concern in Muncie, Ind., which has been operating a fleet of 10 Dodge heavy-duty trucks since last February. The engines of these trucks are provided with the exhaust-valve inserts. In July and August a total of 204 round trips were made between Muncie and Detroit, in which more than 2000 tons of freight were carried, and during this period there was no occasion for grinding or adjusting the valves. These field tests of the new development, of course, were additional to very extensive laboratory tests in which the endurance of the inserts had been proved to the satisfaction of the engineers.

Bonded Salvage Yards May Solve the N. A. C. C. Junking Dilemma

Possibility of accepting certificates of demolition from authorized scrap merchants as basis for payment of bounty studied in Cobleigh report



THE possibility of salvaging old cars no longer fit for the road, for their value as scrap metal and reclaimed parts as a relief from the inconveniences incumbent upon the operation of the present Highway Safety Program, prompted the directors of the National Automobile Chamber of Commerce, upon advice of their sales managers' committee, to authorize the sending out of Mr. H. R. Cobleigh, of the chamber staff to survey the field with the thought of appointing official salvage yards whose certificates of demolition would be acceptable to those manufacturers participating in the plan in lieu of requiring that the car be cracked up in the presence of a factory representative.

As a result of this authorization, Mr. Cobleigh has recently completed a 3,500-mile trip during which he acquired a great deal of information relative to the possibilities of putting such a plan in operation, and as a result of which he is submitting to the N.A.C.C. a concrete plan.

The difficulties of the present plan, whereby the manufacturers set up a junking fund by setting aside a fixed sum for every new car sold a dealer, from which they pay the dealer a certain amount for breaking up an old car in the ratio of one scrapped car to each five new cars sold, arises from the fact that in order to maintain proper supervision, the factories have required that the junked cars be broken up in the presence of a factory representative. This has resulted in additional expense to the factory and considerable delay as well as expense to the dealer. Then too, the

latter has found the process undesirable, as he has frequently had to hold the junk car in valuable storage space for considerable periods of time, has had to employ his own labor for cracking up, and has then usually had to pay to have the remains hauled away. Under this process of cracking up, parts were so destroyed that the car had no value to the junk man or auto wrecker. And, indeed, it has heretofore been the policy of factories to forbid the resale of any parts from the cracked-up cars. Thus after the car was cracked up it became a problem for the dealer to dispose of it.

Mr. Cobleigh proposes to meet this situation by setting up all over the country a number of official salvage yards who will issue certificates of demolition which will be recognized by participating members as sufficient evidence that the car has been destroyed to warrant payment of the Highway Safety Plan bounty. These yards would be bonded not to sell any cars or chassis, but would be permitted to sell reclaimed parts. They would be required, of course to accept all bounty cars offered them, but because of the permission to sell parts, would also be in a position to bid competitively against other salvage yards, scrap metal merchants, auto wreckers and junk yards for any other junk cars offered them. Under this plan factories would not have to keep sending their representatives around to witness the cracking up of cars for which they would pay the bounty, and dealers could sell these cars to the yards as soon as they were taken in in trade. This would obviate the costly storing, labor and disposal on the part of the dealer, and he could send in his certificate and collect his bounty as soon as the car had been sold. Furthermore, it would enable those manufacturers who have not been participating in the High-

way Safety Plan because their volume was too small to warrant their sending representatives all over the country to enter into the plan.

The question of permitting the resale of reclaimed parts was one on which Mr. Cobleigh experienced some doubt before he started out on his survey. However, after examining closely the experience of the Cleveland Guarantee Auto Scrapping Co., which was organized about two years ago to scrap bounty cars for their scrap metal with the understanding that they not only not sell any cars but that they also not sell any parts, and interviewing dealers associations, salvage yards and scrap metal merchants at various points all over the country, he arrived at the conclusion that car scrapping without the sale of used parts could not be made a profitable undertaking. The Cleveland company lost last year almost exactly what it paid the dealers for old cars.

Furthermore, it has now become evident that permitting the resale of salvaged parts not only has no valid objections, but that it has actual advantages to all parties concerned—provided the used parts sold are guaranteed, which would be one of the stipulations of Mr. Cobleigh's plan. He says in this connection:

"A study under the direction of the N.A.C.C. Sales Managers Committee headed by R. H. Grant of General Motors, developed that the sale of used parts was not the evil it was supposed to be. Although it does prolong the life of cars still in owners hands, it at least makes them safer and it is sound economically to repair old cars with used parts.

"In the past year 84 per cent of the cars scrapped at Cleveland were five years old or older, hence the used parts that would have been available for resale would have been practically all for cars at least that old. The factories have learned that their sales of new parts for such cars are extremely small and are handled at a loss. Since owners can and do obtain satisfactory used parts much cheaper from the auto wreckers that have grown up everywhere it was seen to be fruitless to handicap official yards by insisting on the destruction of parts.

"From the owner's standpoint, it is extravagant to put a new part in a car five years old which has only two years of useful life left, particularly a non-wearing part.

"The automobile as an assembly has an average life of seven years but many of the elements in it have an indeterminate life, and to throw such parts away is wasteful. For the manufacturers to make enough of such parts to carry them on inventory for five years only to scrap a great part of them finally is likewise a waste. The dealer would not have them in stock. The owner would have to wait probably two weeks on an average to get them from the factory. The owner saves not only time but money when he can go to a responsible yard and buy a guaranteed second-hand part."

Under Mr. Cobleigh's plan, the seven dealers' co-operative yards now operating to salvage used parts would be among the first yards to receive official recognition. There are also a number of cities with a set-up similar to that in Cleveland all ready to go into operation, and these will also doubtless be appointed as soon as the plan goes into operation.

In other localities it would be necessary to scout out reliable yards who can be appointed to issue the required certificates of demolition. It is Mr. Cobleigh's plan, that yards should be appointed only on the nomination of the local dealers' associations, or where there is no association, on the nomination of a representative

group of local dealers. He would also have most of the supervisory work done by the local dealers, as that would relieve the N.A.C.C. of a great deal of unnecessary routine as far as it is concerned. The yards must, however, in his opinion, receive their appointment from the N.A.C.C. as it is the members of that body who will have to honor the certificates issued by the yards, and they want definite assurance that the car for which they pay the bounty is actually removed from use on the highways.

Welding Frames Will Introduce Greater Chassis Rigidity

(Continued from page 790)

Each class seems to be rather jealously guarding the results of its experiments. Frame manufacturers apparently are worried over the possibility of having to scrap their extensive riveting equipment. Welding equipment suppliers hesitate to actively enter the field, which is probably due to inertia. Individual car manufacturers do not wish to have the knowledge gained from costly experiments become available to their competitors.

It is not the writer's intention to either promote or decry the idea of frame welding. The opinions as to problems involved and advantages and disadvantages given here are those of engineers who have interested themselves in the idea, generally to the extent of securing an appropriation from their companies to carry on experimental work.

It is the writer's opinion, however, that a completely welded frame cannot be achieved without further fundamental knowledge. The manufacturer who supposes he can merely replace rivets by welds in his existing frame is foredoomed to disappointment in the results achieved.

Magnificence on Parade—

Next week we will present some of the outstanding entries in the annual Salon, which opens in New York on November 29.

Here the crowning achievements of automotive design will be displayed by LeBaron, Brunn, Willoughby, Murphy, Judkins, Derham, Weymann, Brewster and other makers of custom bodies.

Several foreign makes will be shown with Duesenberg, Rolls-Royce, Stutz, Chrysler, Pierce-Arrow and Lincoln in this de luxe event of the automotive calendar.

—Next Week

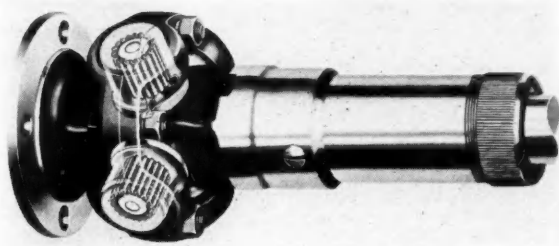
Roller-Bearing Type of Universal Joint Requires Minimum of Attention

A ROLLER-BEARING type of universal joint has been added to the line of the Universal Products Co., Inc., of Detroit. In its development full consideration was given to the various difficulties associated with the operation of such joints, including the difficulty of lubrication, due to its inaccessible location; the difficulty of making repairs needed as a result of lubrication failure, and that due to throwing off lubricant.

The new joint is intended to overcome these difficulties, and is designed to require no attention from the owner or service station during a period corresponding to 50,000 miles of service, or the life of the car. We are informed that already two car manufacturers are scheduled to use this joint on their 1932 models.

It was the belief of the Universal Products Co., Inc., that in order to reduce the attention required to a minimum, anti-friction bearings must be used. Wear on plain bearings is dependent chiefly upon the high temperatures reached by the bearing surfaces. It is stated that with the design shown in the accompanying drawings it is impossible to produce an appreciable increase in bearing temperature even under very heavy loads. This improvement is attributed to the change from a sliding to a rolling motion.

The other two problems which were considered of paramount importance, especially with anti-friction joints, were the exclusion of dirt, water, etc., and the retention of the original lubricant. No grease connections are used. It will be noted that there are two pressed steel cups at the inner ends of bearing car-



Phantom view of roller-bearing type universal joint

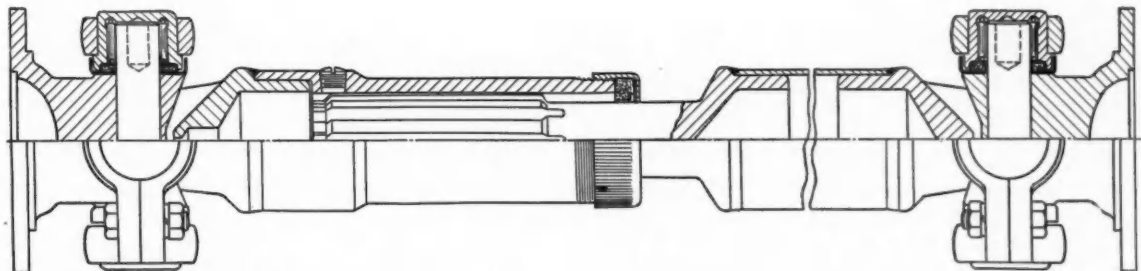
rier. These are so arranged that foreign matter would have to travel against centrifugal force before it could even reach the packing used between the cups. The same is true, of course, for the lubricant within the bearing.

Aside from the adoption of roller bearings and the changes entailed thereby, the joint is

quite conventional. The rollers themselves are approximately $\frac{3}{4}$ in. long, with a diameter of $\frac{1}{10}$ to $\frac{1}{8}$ in., being of the type commonly referred to as "needle" rollers. The end of each roller is tapered or cone shaped, to provide a smaller diameter (about $\frac{1}{16}$ in.) at the ends for properly securing the group of rollers in each retainer. This reduced diameter on one end fits into a groove in the bottom of the cup, while at the other end it fits in around a flange stamped on to one of the aforementioned pressed steel cups. The cup itself is pressed into the bearing retainer or carrier. The assembly permits free rotation of the rollers around the inside of the retainer and around the trunnion.

Universal Products feels that an added advantage of the new design is that it will permit the adoption of smaller universal joints for the same loads, resulting in less weight and less trouble from a balance standpoint, aside from the cost factor involved. To this end special alloy steels have been selected for the various joints parts for maximum strength.

Side loads in the joint are taken at the end of the trunnion pin. The latter is countersunk to form an additional lubricant reservoir. This ring, also serves to prevent the roller retainers from turning.



Universal joint and propeller-shaft assembly

Heintz Mfg. Co. Cuts Body-Die Costs by the Use of Welded Steel

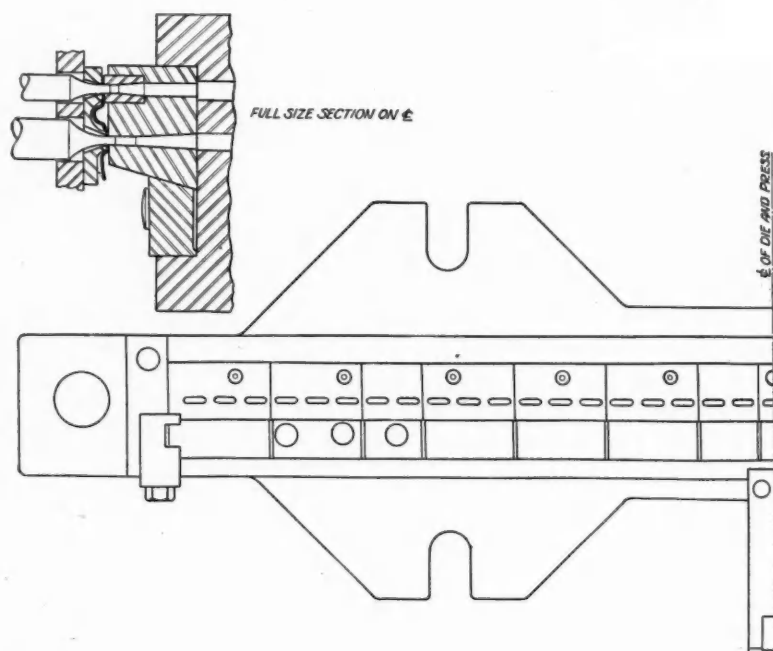


Fig. 1—Assembly of die for piercing slots and holes in roof side panels + + +

Welded die construction is of comparatively recent origin. But it has taken root so rapidly that it is undergoing rather intensive testing and scrutiny in many quarters. Where applied judiciously, economy in overall material and fabrication costs is the chief objective. Since the welded die is composed of a structure of fabricated boiler plate, faced with boiler plate, high carbon steel plate, or an alloy steel casting, comparative costs may be readily estimated. For the cost of the cast iron die consists essentially of a pattern charge, material and machining. And when costs of the new job are more accurately known the comparison will be easy to make.

SOME fertile sources of refinement in die design and fabrication have been tapped recently by many progressive body builders. And in an industry where savings are reckoned in pennies per stamping, these developments have started considerable activity.

Through the courtesy of George H. Hannum, general manager of the Heintz Mfg. Co. of Philadelphia, we were afforded an intimate close-up of the trend of die development in their organization. Much of it probably will be of great interest to those engaged in press shop operation.

Two different but well related courses are being followed. One along the line of welded die construction; the other, utilization of boiler plate for facing punches and for reducer plates. Both are aimed at cost reduction by the judicious substitution of steel for cast iron.

For the present, this company has tried the welded die in several specific places only. One highly successful job is a die for piercing slots and holes in roof side panels. A top view of a portion of the assembly is shown in Fig. 1. Steel was used here because it was felt that cast iron would not be suitable due to lack of adequate metal support between perforations.

It is evident that economy was not a consideration. Cast iron simply would not do. But a rough estimate shows that the steel die probably is cheaper because of a saving in pattern and core box.

Fig. 2 shows details of the welded structure. It is built in the form of a bridge with vertical stiffeners at intervals; the back is solid. This provides ample clearance space for the punches and facilitates cleaning.

Due to low cost and general simplicity, reducer plates 3 to 5 in. thick have been made of cast iron from time

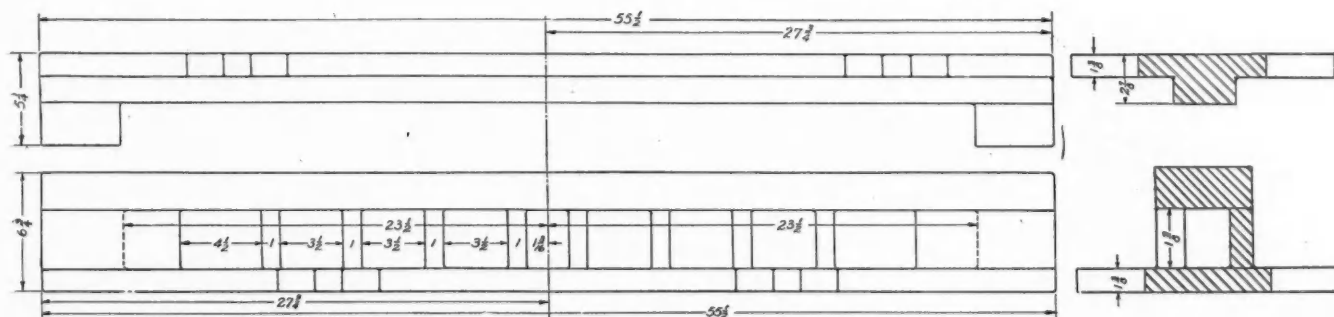


Fig. 2—Details of the die shown in Fig. 1

by
Joseph
Geschelin

Fig. 5—A typical application of steel facings for both upper and lower sections + + +

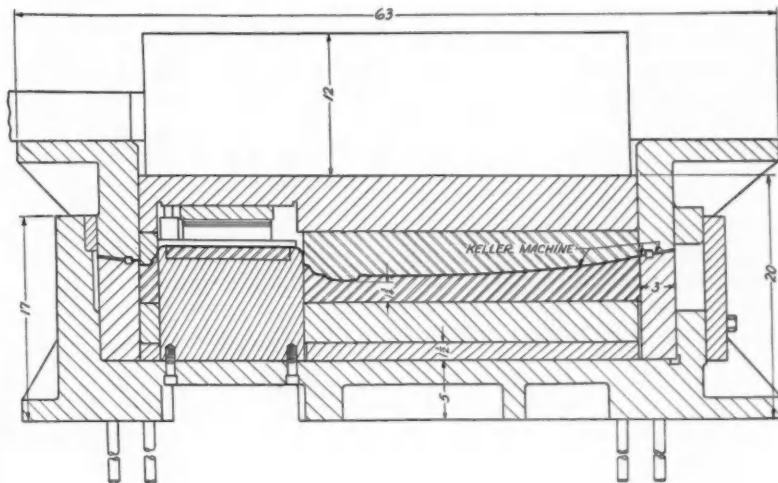


Fig. 4—This simple design illustrates the usual run of reducers + + + +

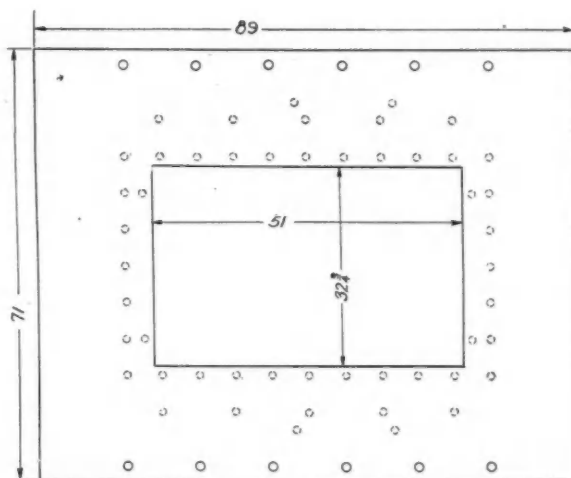
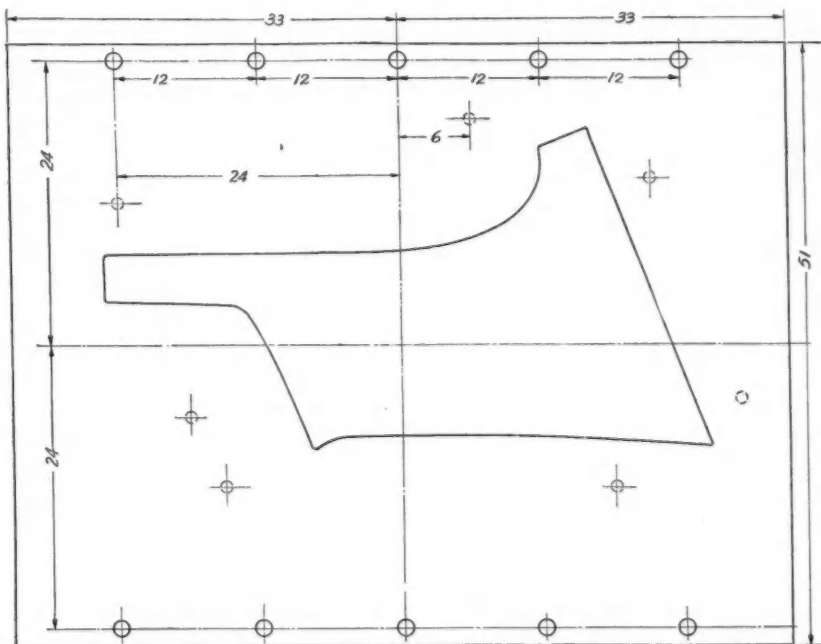


Fig. 3—Details of a reducer made of boiler plate + +



immemorial. But under certain conditions, no doubt when excessive pressure is built up, these plates crack. And they usually fail when needed most. So the program at Heintz is to make new plates of boiler plate stock and replace old plates with steel as breakage

occurs. Fig. 3 is a detail of a reducer recently made of boiler plate. The simple design in Fig. 4 illustrates the usual run of reducers. Experience shows that even the ample sections of this plate do not guarantee freedom from cracking.

As to costs, the probability is that the steel plate may be cheaper even on the basis of initial cost, when the saving in patterns is considered. Remember that the clearance hole no matter how complicated can be cut out quickly with a gas torch.

Another factor to consider is the possibility of reducing the thickness of the piece in steel, thus making a gain in material cost. In considering the feasibility of this it is of interest to look into the comparative working stresses for steel and cast iron. According to Mark's* the working stresses, dead load, for cast iron are: Tension, 4300; compression, 12,800; bending, 6020 (expressed in lb. per sq. in.). The values for mild steel is 17,000 to 21,300 lb. per sq. in. for each type of stress.

Thus, in bending, steel is about three times stronger than cast iron. Now consider the factor of safety required for shock. Mark's recommends 15 for cast iron and 12 for steel. The true advantage of steel then is $15/12 \times 3$ or 3.75.

Of course this does not mean that the thickness of a steel reducer may be cut to one-third, since this depends entirely upon the requirements of rigidity and whether they may be met by a smaller section modulus. Nevertheless, the potential saving is there.

* Mark's Mechanical Engineers Handbook, first edition, p. 389.

Another shift in the direction of economy is the increasing use of mild steel plate of about 0.31 carbon for facing punches and floaters. They have also tried higher carbon material but their experience is not sufficiently extensive to prove whether a more expensive material is necessary. Other body makers have used a considerable tonnage of facings in cast alloy steel.

A typical application of steel facings for both upper and lower sections is found in Fig. 5, which is a draw and preliminary piercing die for a front and outside door panel. As shown, the facing is mounted on the conventional cast iron base being fastened securely with set screws. The facing is machined in the usual manner on Keller machines.

The economics of this construction are quite interesting. First of all, the steel facing is used only on parts with minimum turnunder to reduce machining. The overall cost of the die as compared with cast iron is expected to be lower. In this comparison due weight must be given to longer life and decreased maintenance. Another factor is the elimination of machined inserts so essential in cast iron. But steel has another impor-

tant advantage. If an error is made in machining, or a change in contour is indicated after tryout, it is both difficult and expensive to repair in cast iron. In steel, it is simply a matter of welding or brazing a new corner or section and remachining.

The matters discussed here are of major consequence in cost reduction. Moreover they indicate a progressive shift toward a new era in die design. Die designers as well as press shop executives are watching developments with considerable interest, but they are feeling their way cautiously. For instance, right now only certain types of dies have been experimented with. Ultimately, the significance of the welded die and steel facing will hinge on the success of the work under way.

We must not overlook one of the most important activities in the die design department, namely, standardization. One of the most productive tools available today is that of interchangeable punches and retainers; a good example is the piercing die shown in Fig. 1. With the commercial availability of a large variety of interchangeable punches, there is a growing prospect of making major economies in die costs.

Douglas Steering Gear is of the Nut and Screw Type

AN automobile steering gear of the screw and nut type has been developed in England by J. Douglas of Leabury, Luton, and two sectional views of it are shown herewith. We understand that the gear will shortly be placed on the market in England by a firm which has acquired all patent rights outside of the United States and Canada.

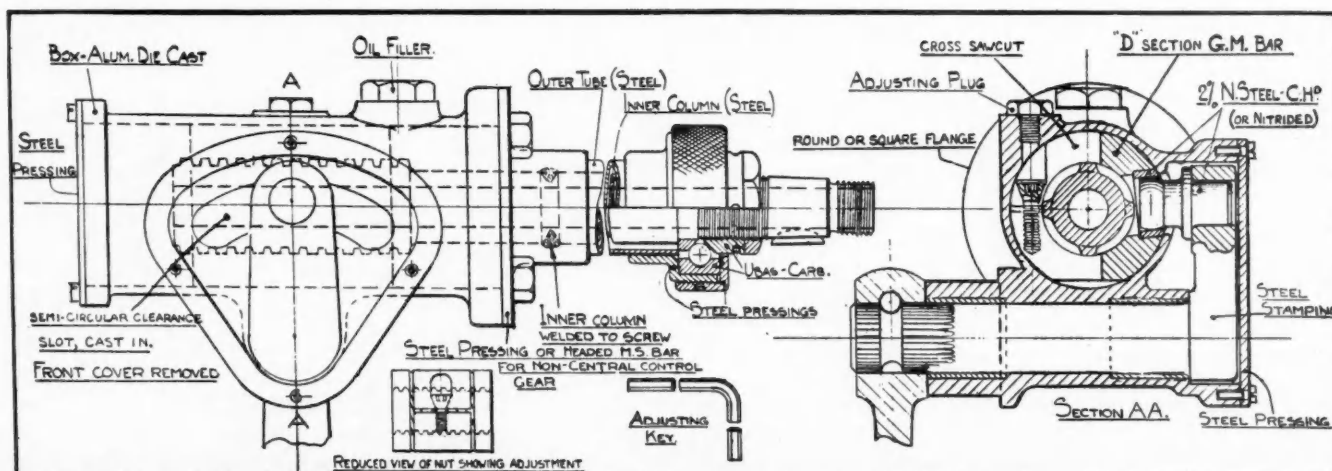
As may be seen from the drawing, the screw forms an extension of the steering shaft, and thrust on it in both directions is taken up on a four-point ball bearing at the top of the housing. The outside surface of the nut is cylindrical and has a bearing in the cylindrical housing. It slides (with a double semi-rotary movement) a distance of about 2 1/4 in. in traveling from full lock to full lock, and is subjected to a tipping action due to the offset of the point of engagement of the rocker-arm ball. Since the ball comes very close to the outer surface of the screw, the offset, and hence the tipping action, is quite small.

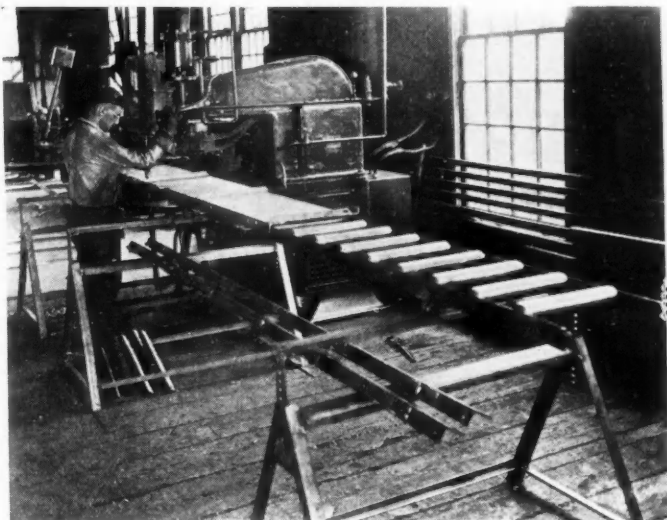
The effective contact area of the nut in the housing is 9 sq. in. and wear on this surface can be neglected, the inventor states.

With the design shown, the steering movement is fastest for the central position of the gear and slows down toward each position of lock. The gear, however, can also be designed so that the center of the rocker shaft does not coincide with the straight-ahead position, in which case the steering movement of the front wheels will be slowed down toward one lock only.

Reversibility of the gear depends on the helix angle of the screw and on the center angle of the stub axle layout of the car.

Wear on the screw and nut can readily be taken up. To this end a small plug is removed, a special key inserted, and the self-locking screw turned so as to draw the central split parts of the nut together until the backlash is removed, whereupon the plug is replaced.





Here's one of the best welding ideas we have seen in a long time. The object is to cut welding time and handling it in the welding of sheet metal sections. Mathews Conveyor Co., well-known makers of roller conveyors, designed the unit shown here for their own use. But they have volunteered to provide complete details to anyone who has a similar problem. Briefly, the set-up consists of adjustable supports on which is mounted a section of a roller conveyor, and this runs on ball-bearing wheels in channels on top of the supports. The sheet metal to be welded is placed on the roller and can be easily moved back and forth under the welder, as well as to the right or left.

Big Help

The Linde Air Products Co. inaugurates standardized markings on all Oxweld welding rods. With three exceptions, all rods $\frac{1}{8}$ in. diameter and larger are stamped with the name "Oxweld" as well as the number and type of rod. On smaller rods where it is not possible to stamp the name the boxes are so marked.

Quick Changing

By the looks of things, the idea of interchangeable punches for press dies is making a big hit. Of course the biggest economy lies in applications on body dies and similar large units. In fact body builders have taken to the idea with characteristic energy. One die we saw has at least 100 separate punches. All readily replaceable at a moment's notice. Cuts maintenance to a ridiculously low figure by comparison.

Frame Welding

People are thinking seriously about welded chassis frames. That's where the welding experts come in. For there are many new problems to be faced. Some discussion of

this took place at the welding session at the Production meeting. One thing to be determined is the effect of annealing adjacent to the weld. According to one expert, annealing is present and will affect the strength of the cross member near the joint. Probably the added strength due to work-hardening may be lost in welding.

Speeding Research

Imagine a metallographic microscope capable of measurements within one 100,000 of an inch. What is said to be the first one of its kind was recently installed in the Cadillac metallurgical lab. It was built by Bausch & Lomb, makers of scientific apparatus. Testing time will be cut in the order of 1 to 40.

From Our Neighbors

W. W. Nichols, vp. of D. P. Brown—our kind adviser on the Production Activity—has just come back from a trip through European metal working plants. He brought with him some fine photos and a lot of impressions. Incidentally he has permission to use this material and maybe we'll hear some lectures on it.

PRODUCTION LINES

Don't Forget

Frank Curtis of Kearney & Trecker brings up a fundamental idea in connection with tungsten-carbide tooling. You'll find it in T-C comments No. 23. When you use T-C tools you don't need as much finish allowance. The economy on many applications lies in the possibility of trimming allowance by actually shaving the pattern. T-C cuts through hard scale of course. Result is—less depth of cut, greater feed, less chips and waste—more economy.

It's Real

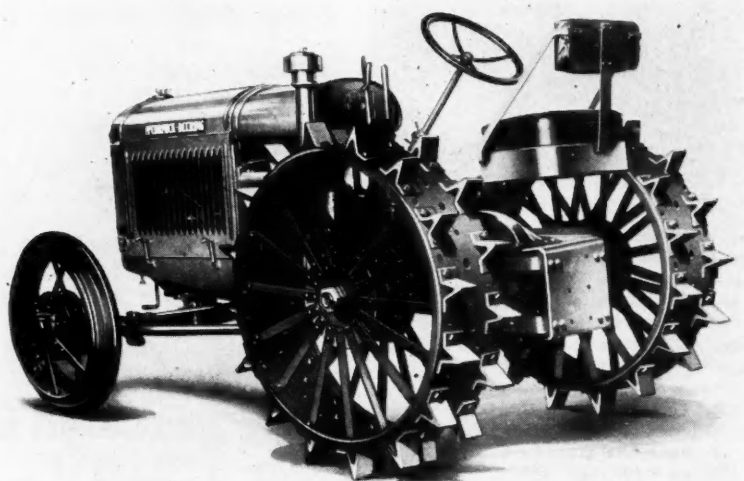
Over in Cincinnati we went through the industrial laboratory set up by the Cincinnati Milling and Cincinnati Grinders outfits. You have to see it to realize that it's not a show room. It's a real shop equipped with the latest milling machines and Centerless grinders. All ready to run. You can come down with one of your latest gadgets and see it finished as it might be in production. Don't pass it up when in Cincinnati. It's a real treat for a man who works with machines.

Cooperating

To serve the users of dies, the Carboly Co. has added a die department to their Detroit tool factory. But many large users find it desirable to rework dies in their own plant. These may now have the advantage of training facilities for their die-room men, because the new Carboly department is designed to give them special instruction—J. G.

MANUFACTURING
MANAGEMENT
METALLURGY

McCormick-Deering Industrial Tractor Is Tested by University of Nebraska



The McCormick-Deering Industrial Tractor "20" is equipped with a four-cylinder engine of the valve-in-head type and developed 29.87 hp. at 1150 r.p.m.

A REPORT on an official test of a McCormick-Deering industrial "20" tractor has been issued by the Department of Agricultural Engineering, University of Nebraska, this being No. 194 in the University's series of tractor tests.

This is a four-wheel tractor provided with an enclosed gear drive and equipped with a four-cylinder vertical engine with a bore of $4\frac{1}{4}$ and a stroke of 5 in., designed to operate normally at 1150 r.p.m. The engine is of the valve-in-head type and is mounted lengthwise on the tractor. Both the inlet and the exhaust valve ports have clear diameters of 1.687 in. The belt pulley is $15\frac{1}{4}$ in. in diameter, has a face of 7 in., and runs at 742 r.p.m. The engine is fitted with a magneto of the company's own make, with a Zenith $1\frac{1}{4}$ -in. carburetor, with a centrifugal governor, and with an oil-and-fiber type air cleaner. Lubrication is by splash with a circulating pump.

The clutch is a single-plate type operated by pedal. Three forward speeds and one reverse are afforded by the transmission, the advertised speeds being $2\frac{1}{2}$, $3\frac{1}{2}$ and 5 m.p.h. forward and 3 m.p.h. backward. The drive wheels have a diameter of 42 in. and a face of 12 in., and they are provided with 32 spade-type lugs 5 in. high and of $3\frac{1}{2}$ in. face.

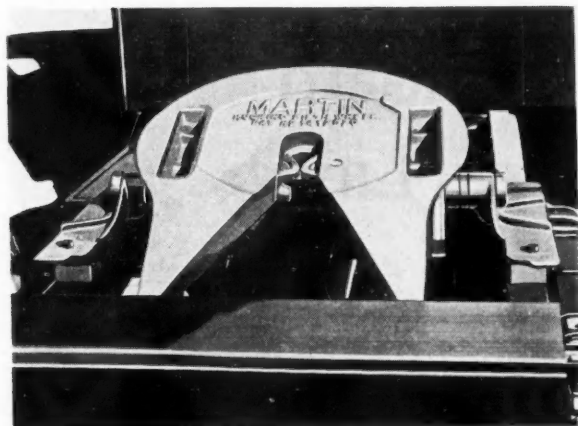
In the tests, gasoline was used as fuel. It weighed 6.11 lb. per gallon. The amount of lubricating oil in the engine at the beginning of the test was 2.64 gallons, of 50 S.A.E. viscosity. The oil was drained at the end of the test, which comprised a total of 50 hours of running, and the drained oil measured 1.608 gallons.

In the "maximum load test" of the engine the latter ran for one hour, developing 29.87 hp. at 1150 r.p.m., with a specific fuel consumption of 0.674 lb. p. hp.-hr. The air temperature was 99 deg. and the cooling-water temperature, 213 deg., the water consumption during the hour amounting to 1.374 gallons. In the rated load test, extending also over a period of one hour, the engine developed 27.03 hp. at 1150 r.p.m., with a specific fuel consumption of 0.66 lb. p. hp.-hr. and a water consumption of 0.832 gallon. During this test the atmospheric temperature was 105 deg. Fahr. and the cooling water temperature 212 deg. Fahr. In the "varying-load tests," consisting of six periods of 20 minutes each, the consumption per hour varied from 1.655 gallons at 0.75 hp. to 3.295 gallons at 29.23 hp.

In the drawbar horsepower rated-load test, in intermediate gear over a period of 10 hours, the tractor developed a drawbar pull of 1679 lb. at a speed of 3.97 m.p.h., corresponding to a drawbar hp. of 17.77. The slip of the drive wheels was 6.02 per cent. In this test 6.09 drawbar hp.-hr. were developed per gallon of fuel consumed.

In the maximum drawbar-load tests the tractor developed 1232 lb. drawbar pull at 5.83 m.p.h. (19.14 hp.) in high gear, 1966 lb. pull at 3.97 m.p.h. (20.80 hp.) in intermediate gear, and 3144 lb. at 2.74 m.p.h. (23.01 hp.) in low gear, with wheel slips of 4.25, 6.89 and 11.39 per cent respectively.

No repairs or adjustments were made during the tests, and the Board of Tractor Test Engineers found no unreasonable or excessive claims in the advertising.



Martin fifth wheel used on the Reo-Martin semi-trailers + +

Semi-Trailers Now Have Place in the Reo Truck Line

ENTRY of the Reo Motor Car Co. into the semi-trailer field is being announced this week. The line consists of semi-trailer units for use with Reo 1½, 2, 3 and 4-ton chassis. Semi-trailers of 16, 18 and 20 ft. lengths for the 1½-ton Speed Wagon chassis are said to be priced particularly favorably to keep the complete unit of tractor and semi-trailer in the lowest priced field.

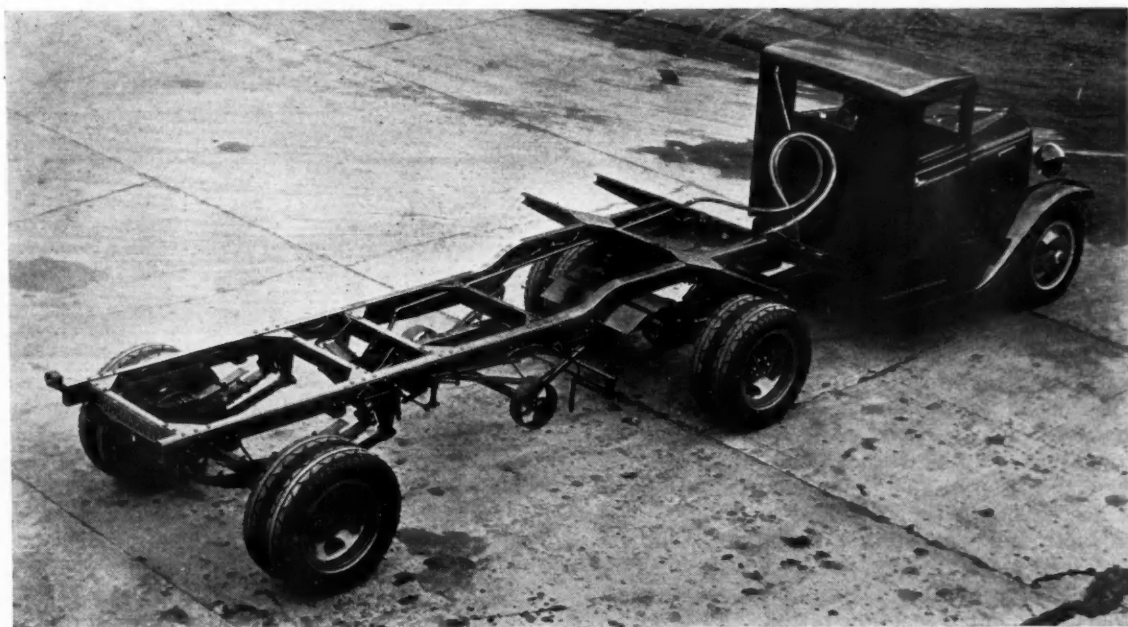
The Reo semi-trailer, furnished to the company by Martin, has a pressed steel channel type frame of tapered design for uniform strength. Frame section for the 16-ft. unit is 7¼ by 3 by 7/32 in., with six channel type cross members, all gusseted to both upper and lower side-rail flanges. Body mounting outriggers are riveted and gusseted to the frame also.

Axles are of chrome nickle steel with a two by three

inch section beam and a 2 11/16 in. diameter spindle. Helper springs are standard equipment, all springs being of silico manganese steel. Brakes are also provided on the semi-trailer, these being extensions of the tractor truck's hydraulic brakes, for coordinated operation. Drums on the semi-trailer are 16 in. in diameter and 3½ in. wide, and of cast steel structure.

The fifth wheel unit is a Martin 24 in. rocking fifth wheel with automatic locking device. It is equipped with shock springs, and is interchangeable with a majority of all semi-trailers now in use.

The 16, 18 and 20 ft. semi-trailers for the two and three-ton tractors have a 10 in. channel depth frame, while a 12-in. section is used for the trailers to go with the four-ton truck.

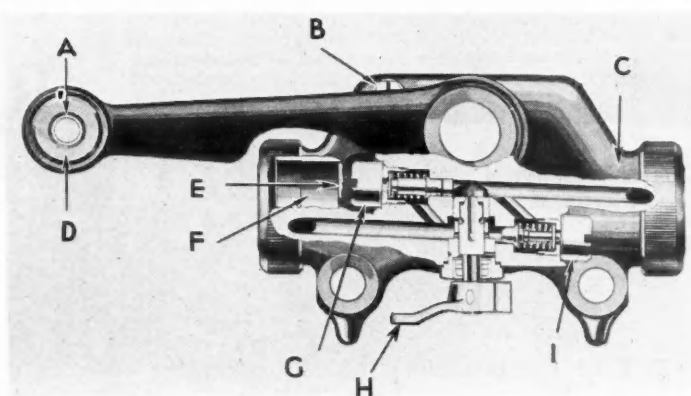


Semi-trailer chassis hooked to a Reo 1½-ton Speed Wagon tractor truck

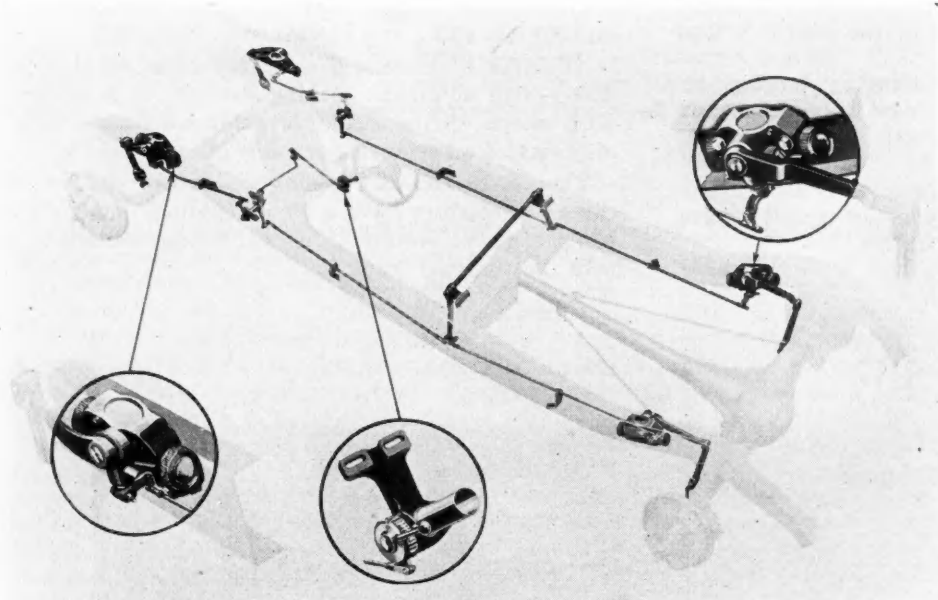
Delco Ride Regulator Standard Equipment on 1932 Buick Line

THE entire 1932 Buick line just announced, with the exception of the two-passenger business coupe and the five-passenger sedan of the Series 50, is equipped with a ride regulator made by the Delco Products Corp. of Dayton, Ohio.

Instead of having a fixed orifice for the oil as in the Delco Products hydraulic shock absorbers, a needle valve is used. This needle valve can be raised or lowered to restrict or open up the orifice by means of a lever located on the steering column, and a linkage which closely resembles a four-wheel brake hookup, with equalizers, etc. The "ride regulator" permits the selection at will of anything from a soft "boulevard" type of ride to a very firm ride for high speeds.



Above—Delco ride regulator valve + + +



Left—Ride regulator linkage + + + +

- A Bronze Bushing
- B Oil Filler Plug Screw
- C Rebound Cylinder
- D Rubber Bushing
- E Piston
- F Compression Cylinder
- G Rebound Relief Valve
- H Ride Regulator Valve
- I Compression Relief Valve

Two Processes of Reclaiming Rubber

A CIRCULAR on reclaimed rubber has been issued by the Bureau of Standards, and will be found of value to all those interested in waste utilization.

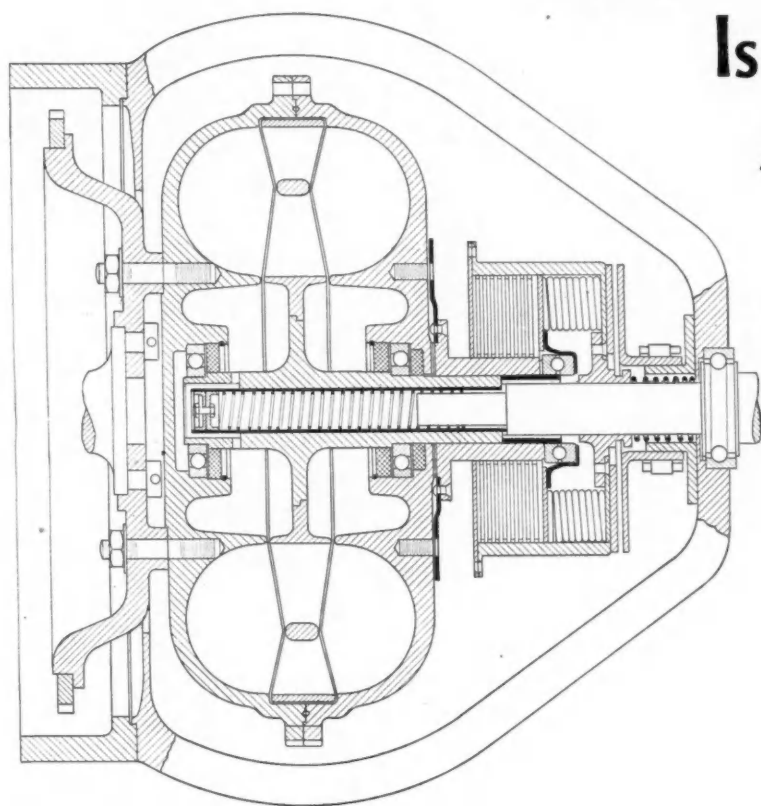
While reclaimed rubber is not equal to new rubber in strength, stretch, and resistance to abrasion, it may be used successfully for many products.

In manufacturing operations, reclaimed rubber can be processed more readily and at less cost than crude rubber, but present reclaiming processes are not well adapted to small-scale operation. As is to be expected, the consumption of reclaimed rubber fluctuates with the price of crude rubber.

The two methods for reclaiming rubber, the alkali process and the acid process, are described. The majority of the reclaiming is done by the former process in which the ground scrap rubber is digested with sodium hydroxide solution and softeners under pressure to destroy the fabric, remove the free sulphur and plasticize the rubber. The product is washed, dried, refined, strained and sometimes compounded before marketing.

Copies of this circular may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

Fluid Torque Converter Is Adapted to the Automotive Field



Sectional view of Grade fluid
torque converter + + +

THE German engineer, Hans Grade, has evolved a new form of fluid torque converter for automotive use, of which a sectional view is reproduced herewith. It consists of a drum-like casing which is either bolted to a light flywheel or takes the place of same. Inside of the housing there are two chambers, a central chamber and an outer annular chamber. Keyed to the driven shaft and located at the center of the housing is an impeller wheel. This impeller wheel is provided with two sets of blades, inclined in

And can replace flywheel
on the average car + +

by Edwin P. A. Heinze

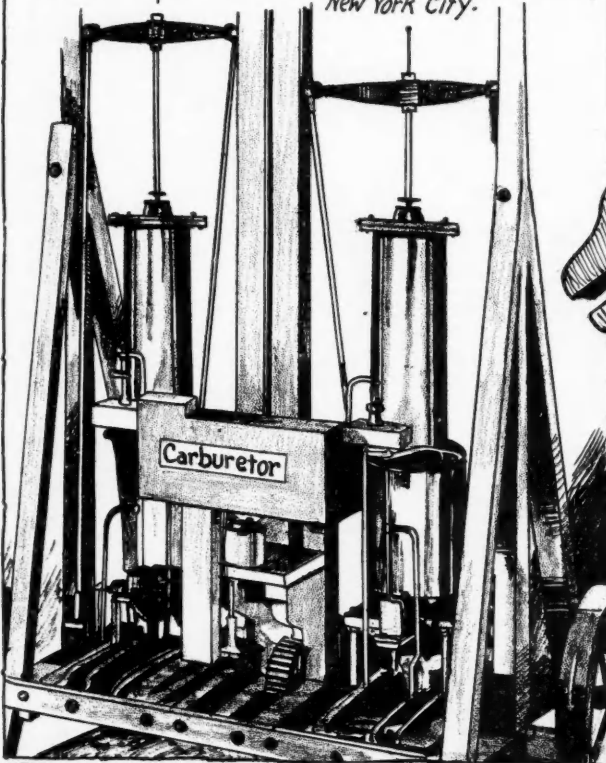
opposite directions, which divide the annular chamber into two sections. Each section of the annular chamber is provided with inclined vanes. The entire interior of the housing is filled with water, and the vanes in the housing set the water in motion within the housing so that it passes through the inner blades of the impeller in one direction and through the outer blades in the opposite direction. The resulting impact on the impeller blades produces a torque on the impeller and on the propeller shaft. Normally the car is provided with a friction clutch and a transmission giving two forward speeds and one reverse. The table below shows results obtained with the torque converter fitted to a Ford Model A car:

Results with Torque Converter on Model A Ford

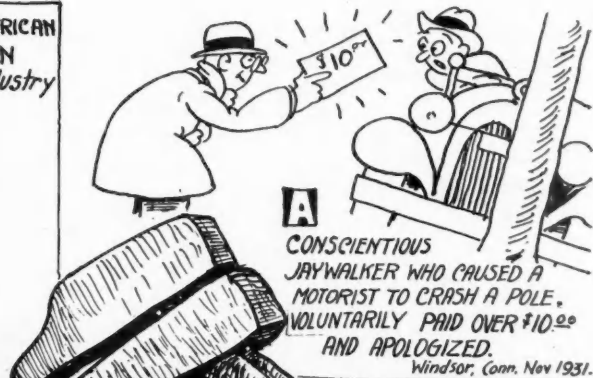
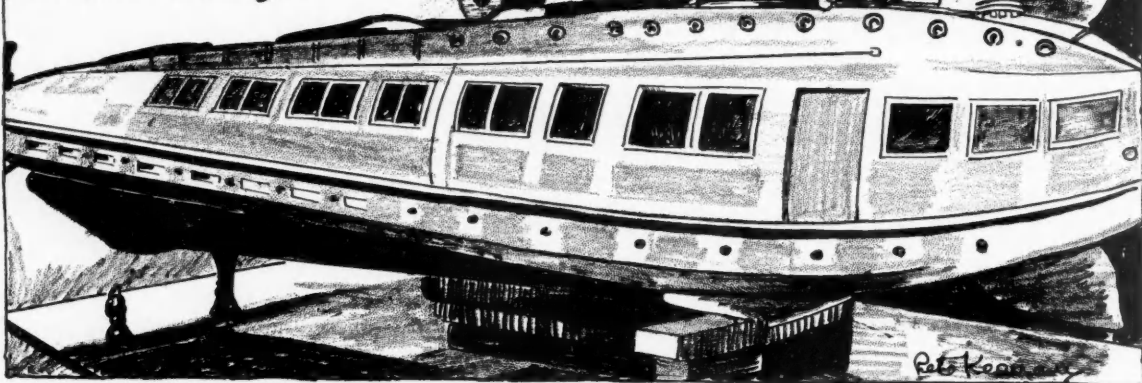
Engine		Torque Converter	
R.p.m.	Torque (lb. ft.)	R.p.m.	Torque (lb. ft.)
180	43.3	00	107.0
500	86.8	340	112.8
1000	108.5	870	115.7
2000	110.6	1930	112.0
2500	102.7	2480	102.7

Automotive Oddities—By Pete Keenan

ABSOLUTE PROOF THAT SAMUEL MOREY, AMERICAN INVENTED THE CARBURETOR AWAY BACK IN 1826. This Engine is in the Museum of Science & Industry New York City.



GEN. J. ALBERT DE PASSY, RECENTLY RELEASED FROM SING SING, IS PROMOTING A GIGANTIC AIR LINER TO CROSS THE ATLANTIC IN 36 HOURS CARRYING 1500 PASSENGERS. He says the motors for this super craft are now being constructed at Reading, Pa.

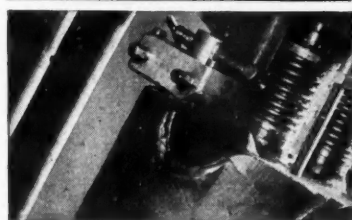


A CONSCIENTIOUS JAYWALKER WHO CAUSED A MOTORIST TO CRASH A POLE, VOLUNTARILY PAID OVER \$10.00 AND APOLOGIZED.
Windsor, Conn. Nov 1931.

WRENCHES WERE USED 2000 YEARS AGO. HERE IS AN EARLY TYPE OF "MONKEY" WRENCH IN WHICH A WEDGE WAS USED TO HOLD THE JAWS.
(From Blackhawk Mfg. Co.)

Do You Know
An "Oddity"?

Correspondence about "Automotive Oddities" is invited. Contributions used will receive editorial mention when practicable. If you are interested in the source of, or the reason for, a particular "Oddity," ask the editorial department of Automotive Industries about it.



NEWS

OF THE INDUSTRY



Jardine Gives The Case For Aluminum

NEW YORK, Nov. 19—Light-weight vehicles being developed in every line of transportation, but slowly in the passenger car field because the average owner does not know costs of operation, Frank Jardine, Aluminum Co. of America told members of the met.-section, S.A.E. at regular monthly meeting this evening. In the commercial vehicle field where greater pay load can be obtained without increasing the gross rating, use of aluminum bodies has been practiced and its use in chassis is also increasing. Manufacturers have been slower to adopt its use than have operators, but as customers become more conscious of savings they may demand its wider use.

Weight saving of approximately fifty per cent is available at a cost of about 15 to 25 cents per pound saved. Where stiffness is required this can be secured by careful ribbing so as not to counteract weight saving. Tensile strength is about the same as iron. Use in many parts of engine, axles, and frames if properly stiffened has proven satisfactory. Aluminum, heat treated, is as satisfactory as cast iron and forged aluminum, is comparable with mild steels, he indicated.

Mr. Jardine showed several slides of aluminum cars developed by Peerless, trucks developed by Aluminum Co. and buses developed by General Motors Truck Co.

LaFrance Adds Truck

LaFrance-Republic Corp. has added a new six-cylinder unit in the 2½-ton class to its line. It is designated as Model E-1, rated a 13,000 lb. gross and offered in four wheelbases, including a standard of 162 in. and a maximum of 190 in. This new model is powered by a Buda H-260 3½ x 4½-in. six-cylinder engine.

CHICAGO Buick salesmen were told of the "silent" qualities of the new Buick with "sound" movies—and in the Studebaker theater.

Hazards of street parking were demonstrated when a truck hit a taxi recently. The cab caught fire, setting the truck ablaze. Two other cars, parked at the spot, were ignited, and as a result four autos burned.

When the drivers of both cars in an accident fled, police were puzzled, but inspection of the motor numbers showed both had been stolen—one from Robert E. Kinsman, automobile insurance salesman!

Vincent Bendix and Harvey Firestone may have made Mayor Cermak tardy or they may not have—anyway, they were on the speakers' stand with His Honor when that dignitary was given the Bronx cheer by waiting fans at the opening of the six-day bicycle races. The booing was so bad the mayor just fired the starting gun in the air and yelled "Hoodlums" into the loud speaker system. He later had five arrested.

by
Edwin McK.
Johnson

THE
NEWS
TRAILER

Endorses New Warranty

NEW YORK, Nov. 18—National Automobile Chamber of Commerce has endorsed a new standard passenger car warranty and recommended it for adoption by all passenger car makers. Under the new plan, motor car buyers will receive protection against mechanical defects through all of the entire unit, including accessories, with the exception of tires, for a period of 90 days after purchase or until the vehicle has traveled 4000 miles, whichever shall happen first. The old standard warranty was based on a flat limitation of 90 days and excluded mention of the accessory equipment.

Parellel with the standard warranty is a proposed owner's service policy which makes provision for correction of defects in material or workmanship during the life of the contract by any authorized dealer of the car manufacturer without charge to the owner, and from one to three periodic inspections and adjustments of the new car, depending upon its cost.

The new warranty is not obligatory but is intended to define responsibilities which manufacturers can reasonably be expected to assume.

Reo Meets The Pound Half Way

Reo is offering its commercial lines at the London Commercial Motor Show at landed cost price.

Reo did not take part in the passenger-car show which preceded the commercial exhibition but is making a great effort to retain its worth-while share of the British commercial transport market.

In this endeavor, prices have not been raised as yet. The British subsidiary company has exhausted its stocks and is selling freshly imported units without either profit or distribution and promotion coverage. The exchange position is being keenly watched, in a hope that a rise in the pound will make it unnecessary to increase retail prices at all or only very slightly.

Has New Marine Engine

DETROIT, Nov. 19—The Amplex Products Division of Chrysler has announced availability of a new "Regal" four-cylinder rubber-mounted marine engine, with a maximum output of fifty-five hp. and a weight of approximately 550 lb. The new model will list at \$395.

Plymouth Models Continue Into '31

DETROIT, Nov. 19—Present Plymouth models will be shown at the New York and Chicago National Automobile Shows, according to an announcement from the Plymouth Motor Corp.

Studebaker Orders Tools

CHICAGO, Nov. 14—Studebaker Corp. has placed an order for machine tools amounting to \$200,000 with other orders to follow, which will bring the total to \$500,000.

Growth of Farm Motor Trucks

(Continued from page 787)

Tables Courtesy The Farm Journal

	Number of Farm Motor Trucks			Percentage of Farms Having Trucks		
	1930	1920	Increase	1930	1920	Increase
Maine	10,781	1,120	862.6%	25.3%	2.2%	831.1%
New Hampshire	4,539	717	533.1	27.2	3.2	511.0
Vermont	5,035	616	717.4	18.6	2.0	703.0
Massachusetts	9,572	3,535	170.8	31.2	9.8	154.5
Rhode Island	1,701	536	217.4	41.1	11.5	190.0
Connecticut	6,344	1,595	297.7	31.5	6.1	294.0
New York	58,974	9,259	536.9	33.8	4.5	526.3
New Jersey	14,753	3,380	336.5	11.0	10.4	306.6
Pennsylvania	47,062	9,372	402.2	25.0	4.3	392.7
Delaware	2,996	304	885.5	28.6	2.8	882.7
Maryland	11,284	2,805	302.3	23.6	5.3	299.3
Virginia	19,459	2,544	664.9	10.5	1.3	651.9
West Virginia	7,432	936	694.0	8.4	1.0	682.8
North Carolina	18,558	2,671	594.8	6.3	0.9	590.4
South Carolina	6,966	1,736	301.3	4.2	0.8	308.6
Georgia	15,967	3,145	407.7	5.9	0.9	416.2
Florida	12,203	1,617	654.7	18.4	2.8	623.5
Ohio	39,210	7,319	435.7	16.7	2.7	427.2
Indiana	30,037	3,671	718.2	15.7	1.7	713.1
Illinois	40,371	6,154	556.0	18.1	2.5	558.2
Michigan	36,768	4,886	652.5	20.6	2.4	645.4
Wisconsin	51,786	4,044	1,180.6	27.6	2.1	1,187.1
Kentucky	7,188	1,538	367.4	2.7	0.5	363.2
Tennessee	9,039	1,430	532.1	3.5	0.5	528.7
Alabama	12,838	1,180	988.0	4.7	0.4	992.4
Mississippi	16,503	1,005	1,542.1	5.0	0.3	1,580.4
Minnesota	36,557	3,803	861.3	19.2	2.1	865.5
Iowa	32,669	8,910	266.7	14.8	4.1	267.7
Missouri	20,132	5,059	297.9	7.5	1.9	293.9
North Dakota	16,990	774	2,095.1	21.2	1.0	2,121.0
South Dakota	14,816	4,353	240.4	17.4	5.7	240.9
Nebraska	26,045	6,548	297.8	19.4	5.1	297.5
Kansas	33,648	3,928	756.6	19.3	2.3	746.4
Arkansas	11,000	1,027	971.1	4.3	0.4	981.8
Louisiana	9,281	874	961.9	5.4	0.6	1,005.8
Oklahoma	23,930	2,155	1,010.4	11.3	1.1	1,013.0
Texas	52,580	5,399	873.9	10.1	1.2	875.1
Montana	14,615	1,225	1,093.1	29.0	2.0	1,081.1
Idaho	6,281	837	650.4	14.4	1.9	668.4
Wyoming	4,108	591	595.1	23.9	3.5	589.5
Colorado	16,918	3,016	460.9	26.8	4.8	456.6
New Mexico	5,328	593	798.5	16.0	1.8	810.1
Arizona	3,062	581	427.0	19.2	5.3	415.9
Utah	4,189	572	632.3	14.7	2.1	632.7
Nevada	1,241	174	613.2	32.5	5.1	594.4
Washington	18,836	3,371	458.3	24.9	4.8	455.5
Oregon	9,741	1,819	435.5	16.5	3.4	427.2
California	40,971	6,416	538.6	26.3	5.0	503.7
Total	900,304	139,140	547.0%	13.4%	2.0%	542.7%

Farm Motor Cars and Tractors, 1930

	All Cars	Automobiles	Motor Trucks	Tractors
New York	200,890	141,916	58,974	40,369
Pennsylvania	199,284	152,222	47,062	33,513
Ohio	210,762	201,552	39,210	52,974
Indiana	184,593	154,556	30,037	41,979
Illinois	233,244	192,873	40,371	69,628
Michigan	228,690	150,922	36,768	34,579
Wisconsin	228,550	176,764	51,786	50,173
Minnesota	222,274	185,717	36,557	48,457
Iowa	273,181	240,512	32,669	66,258
North Dakota	95,788	78,798	16,990	37,605
South Dakota	96,739	81,923	14,816	33,837
Nebraska	167,189	141,144	26,045	40,729
Kansas	204,666	171,018	33,648	66,275
Montana	52,781	38,166	14,615	19,031
Wyoming	16,932	12,824	4,108	4,110
Colorado	69,176	52,253	16,918	13,334
Nevada	4,162	2,921	1,241	360
Washington	74,831	55,995	18,836	8,388
Oregon	57,181	47,440	9,741	9,838
California	177,813	136,842	40,971	44,437

States Averaging Less Than 1 Car Per Farm

	All Cars	Automobiles	Motor Trucks	Tractors
Virginia	107,922	88,463	19,459	9,757
West Virginia	44,410	36,978	7,432	2,792
North Carolina	151,434	132,876	18,558	11,426
South Carolina	68,720	61,754	6,966	3,462
Georgia	104,446	88,479	15,967	5,870
Florida	38,590	26,387	12,203	5,618
Kentucky	93,972	86,784	7,188	7,322
Tennessee	98,071	89,032	9,039	6,865
Alabama	86,472	73,634	12,838	4,664
Mississippi	102,066	85,563	16,503	5,542
Missouri	196,598	176,466	20,132	24,999
Arkansas	76,935	65,935	11,000	5,684
Louisiana	52,363	43,082	9,281	5,016
Oklahoma	151,378	127,448	23,930	25,962
Texas	352,756	300,176	52,580	37,348
Idaho	40,247	33,966	6,281	4,691
New Mexico	20,723	15,395	5,328	2,497
Arizona	12,978	9,916	3,062	2,558
Utah	21,763	17,574	4,189	1,426
United States	5,034,929	4,134,625	900,304	920,378

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Nov. 18—The rally in commodity and security prices was checked last week. Nevertheless, business sentiment as a whole appears decidedly more cheerful than it was a fortnight ago. This improvement is probably due, in part at least, to the general belief that currency hoarding, both here and abroad, has passed its peak. Business activity remains at a low level, with slight improvement in some directions offset by further recession in others.

CAR LOADINGS

The movement of railway freight declined during the week ended Oct. 31. Loadings during that period totaled 740,363 cars, which marks a reduction of 29,310 cars below the total for the preceding week, 194,353 cars below that for the corresponding week last year, and 331,871 cars under that for the same week two years ago.

BANK DEBITS

A similar trend is shown by bank debits outside of New York City, which, during the week ended Nov. 11, were 34 per cent smaller than those during the corresponding period last year. The total for the year to date is 22 per cent below that reported a year ago.

ELECTRICITY PRODUCTION

Production of electricity by the electric light and power industry of the United States for the week ended Nov. 7, according to the National Electric Light Association, was smaller than in the preceding week and 5.8 per cent below the total for the corresponding period last year. The decline from the preceding week is attributed largely to the Election Day holiday.

CONSTRUCTION AWARDS

The valuation of construction contracts awarded in 37 states in October, according to the F. W. Dodge Corp., was 28 per cent smaller than in October, 1930. The total for the first ten months of the year is 30 per cent below that a year ago.

COTTON CONSUMPTION

Consumption of lint cotton by mills in the United States last month amounted to 462,025 bales, which compares with 463,704 bales in September and 443,284 bales in October last year. For the first three months of the cotton season, total consumption amounted to 1,351,548 bales, as against 1,189,300 bales consumed in the similar period a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices stood at 68.5 last week, as against 68.3 a week earlier and 68.5 two weeks earlier.

BUSINESS FAILURES

Business failures reported to Bradstreet's last week numbered 471, the smallest total since the week of Sept. 18. Last week's figure compares with 596 for the preceding week and 394 a year ago.

RESERVE STATEMENT

Bill and security holdings of the Federal Reserve banks declined \$65,000,000 during the week ended Nov. 11, with decreases of \$20,000,000 in discounts and \$45,000,000 in holdings of bills bought in the open market. Note circulation increased \$3,000,000, deposits \$14,000,000, and reserves \$56,000,000. The reserve ratio rose from 61.5 to 62.5 per cent. Loans to brokers and dealers on security collateral by reporting member banks in New York City declined to a new low level at \$831,000,000, which compares with \$849,000,000 a week earlier and \$2,235,000,000 a year ago.

Valley Steel Mills Increase Output

Automotive Orders Bring Them to 40 Per Cent of Capacity

NEW YORK, Nov. 19—Buying of sheets, strip steel and wire products by automotive consumers has made possible a rate of operations in Mahoning and Shenango Valley mills estimated at close to 40 per cent of capacity. Bookings suffice to keep the mills running at this rate for the next fortnight without having to figure on additional commitments. Not so very long ago it was said that, if the mills could attain the operating rate now in effect, the year's final quarter would furnish the one bright spot in the 1931 record. Taking the industry as a whole and using as a basis for computation theoretical ingot output, a gain of only 15 per cent over the low in operations is reported by statisticians, but it is quite possible under prevailing conditions that there can be a more marked stepping up in the operations of finishing mills than is revealed by figures covering primary steel production.

Very gratifying is the report of better activity in the market for those ferroalloys that find their principal utilization in automotive alloy steels. An outstanding feature of automotive buying at this time is the large number of orders without the tonnages involved in any one being of large proportions, thus clearly indicating that all of the manufacturers and parts makers are beginning to take more of an interest in the market, even though their initial purchases are light.

Prices are holding fairly steady except for strip steel, in which occasional concessions are reported. The steel industry is leaning backward in its effort to avoid misleading impressions regarding the extent of the improvement bringing fresh disappointments and refrains from accepting the betterment as indicative of an upward trend until a longer period than a few weeks has clearly demonstrated that the demand is really working higher.

Pig Iron—Small lot buying continues to feature automotive pig iron demand. Large stocks in furnace yards impart an easy tone to the market. Quotably it is unchanged, but in some individual sales into consuming points where intensive competition is engendered by the freight rate structure concessions of from 50 cents to \$1 ton from quoted prices are the rule rather than the exception.

Aluminum—Organization of the Alliance Aluminum Co. at Basle, Switzerland, with a capital of \$7,000,000, in which the Canadian, English, Swiss, French, German and part of the Norwegian industry are represented, assures the orderly marketing of European surplus stocks and precludes their being sacrificed in foreign markets. Prices here are unchanged.

Copper—The impression prevails that after all an agreement will be reached on curtailment. Meanwhile the market is virtually at a halt.

Tin—Straits tin was quoted at 23 cents at the beginning of the week, the market being slightly easier.

Lead—Demand has subsided. Market quiet and steady.

Zinc—Firm.

Automotive Industries

Farm Motor Cars and Tractors

Tables Courtesy *The Farm Journal*

	All Cars	Automobiles	Motor Trucks	Tractors
Maine	37,008	26,227	10,781	3,410
New Hampshire	15,618	11,079	4,539	1,096
Vermont	23,655	18,620	5,035	2,426
Massachusetts	27,210	17,638	9,572	3,921
Rhode Island	4,270	2,569	1,701	589
Connecticut	19,498	13,154	6,344	2,667
New Jersey	37,124	22,371	14,753	8,088
Delaware	11,720	8,724	2,996	1,600
Maryland	49,256	37,972	11,284	7,208

Plan Demonstration of Communications

NEW YORK, Nov. 17—A special feature of the dinner of the Overseas Automotive Club to be held Dec. 9 at the Hotel Traymore, Atlantic City, in conjunction with the joint show of the National Standard Parts Association and the Motor and Equipment Association, will be a demonstration of international communications.

For this purpose, the Postal Telegraph-Cable Co. will set up in the hotel their facilities so that the diners will be in direct communication with automotive distributors in Rio de Janeiro, Buenos Aires, Santiago, Havana, London, Paris, Hawaii, Manila and Shanghai. This communication will be held by cable and radio combinations so that reports of conditions as they are at the minute can be asked for and received right at the dinner.

Milwaukee Section Meets

MILWAUKEE, Nov. 16—W. C. Young, sales manager of the Goodyear-Zeppelin Corp., Akron, Ohio, was the guest speaker at the November dinner-meeting of the Milwaukee Chapter S.A.E. at the Athletic Club. Mr. Young predicted that competition between the airship and the steamship is a coming development in trans-oceanic transportation, explaining that his company invested \$2,500,000 in a plant to build a \$5,000,000 "Akron" for the U. S. Navy because it has faith in a great commercial future for that type of aircraft.

Show Plans Discussed

NEW YORK, Nov. 16—Plans for the 1932 National Shows were discussed today at the usual luncheon tendered by S. A. Miles, show manager, to representatives of the automotive trade papers at the Engineers' Club.

Mr. Miles proved the usual genial host and outlined the present apparent condition of the shows with regard to space reservations, and asked specifically for any suggestions as to improvement in the show and attendance.

The major car and truck companies, Mr. Miles pointed out, will fill the first three floors of the Grand Central Palace in New York, and will take care of the usual allotment in the Coliseum in Chicago. While reservations from the shop equipment manufacturers have not been as heavy this year as they have in some years past, the

fourth floor in New York and the available space in Chicago will be well filled in the 1932 shows.

Studebaker Officials Honored at Dinner

Prominent Studebaker officials were honored at a recent dinner of the Honorable Old Guard of Studebaker, an organization of pensioned employees, in South Bend, Ind. Albert Russell Erskine, president of the corporation; Paul G. Hoffman, vice-president in charge of sales, and John F. Cotter, general counsel, were awarded gold medals in recognition of their 20 years' service with the company. Presentations were by Frederick S. Fish, chairman of the board. Others to receive medals were George M. Studebaker, son of Clement Studebaker, one of the founders; Charles Arthur Carlisle and J. M. Studebaker, Jr. Retirement of Lewis Archambeault after 50 years of continuous service was announced.

Leases Kissel Plant

HARTFORD, WIS., Nov. 16—Taxicab Mfg. Co. of America, Inc., has been organized by S. G. Skolnik, M. M. Weflin and J. J. Uppstrom, all of Chicago, and has leased two floors of the Kissel Motor Car Co. plant here to fill an order for 60 Bradford type taxicabs for the Yellow and Checker Cab companies at Milwaukee. Parts for the cabs have been purchased from the Fuller & Johnson Co. of Madison, Wis., which recently acquired the stock and service departments of the Kissel company. Assembly of the cabs will require about three months' time. Organization of the taxicab company has no bearing on the Kissel company, which is awaiting a receivers' sale set for Nov. 27 after postponement of the auction originally scheduled for Oct. 23.

Perfex Adds Heater

MILWAUKEE, Nov. 16—The Perfex Corp., manufacturers of radiators, is announcing the addition to its line of products a hot water heater for motor cars. It is of the all-copper type and has full brass tanks for resisting rust and corrosion. The new heater is also adaptable to household use. The Perfex company is manufacturing the complete unit and selling through distributors. Sales so far are exceeding production, which averages 720 units for a nine-hour day.

November 21, 1931

Men of the Industry and What They Are Doing

Willys Returns to U. S.

NEW YORK, Nov. 18—John N. Willys, automobile manufacturer and now Ambassador to Poland, arrived here this week on a vacation. Mr. Willys spoke highly of Poland's efforts to weather the present depression and feels that it has been successful in these efforts.

That country has been only slightly affected by the monetary crises in Europe, and he does not regard the possible influence which Russia may exert as particularly pernicious.

Bauer Reports Progress

NEW YORK, Nov. 18—George F. Bauer, export manager of the National Automobile Chamber of Commerce, who is at present engaged upon a lecture tour of the Far East, reports that motor vehicles are rapidly replacing the more primitive modes of transportation in the most backward sections of the Oriental countries. Motor trucks and tractors are replacing elephants and bullocks in the teak forests and rice fields of Siam. Automobiles, trucks and buses are emancipating human beasts of burden in India, China and Japan.

The advantages of the motor vehicle are particularly noticeable in those countries where heavy rains make any form of transportation impossible during long periods of the year. During such periods, it costs nothing to have motor transport units lying idle, while draft animals and human beasts of burden must be fed. There is also a high mortality rate among elephants and other beasts of burden which make their use, in many cases, more expensive than that of motor vehicles.

In the larger Oriental cities, the buses are rapidly becoming the means of transportation of even the poorer classes of people.

Mr. Bauer will visit several European cities before returning to the United States.

Aluminum Industries' Changes

Reorganization of the sales department of Aluminum Industries, Inc., interrupted by the death of F. J. Glennon, has been completed, according to announcement by H. J. Hater, vice-president and general manager.

Charles W. McDaniel, formerly vice-president of the advertising firm of Clark, McDaniel, Fisher and Spelman, Inc., of Cleveland and Akron, has been named director of sales. Wright E. McIlroy, former supervisor of distribution for S.K.F. Industries, Inc., and past president of the National Standard Parts Association, has

been appointed sales manager. E. R. Michener, who for two years, has had charge of the statistical department of the company, has been named assistant sales manager.

A. O. Smith Elects Heath

W. C. Heath, who resigned Nov. 1 as vice-president of Fairbanks, Morse & Co., Beloit, Wis., in charge of manufacturing, to join the A. O. Smith Corp., Milwaukee, has been elected vice-president of the Smith company in complete charge of research, engineering and manufacturing, it is announced. His duties will be to correlate the research and engineering branches with the factory production program.

Trindl Names Lauder

Trindl Corp. of Aurora, Ill., has appointed A. W. Lauder, formerly general sales manager and vice-president of Lyon Metal Products, Inc., as general manager. Under his management, all manufacturing plants of the Trindl company are being consolidated and it is expected that shipments from Aurora will result in quicker and better delivery to all Trindl jobbers.

Petroleum Imports Drop

NEW YORK, Nov. 18—Imports of petroleum at the principal ports of the United States for the week ended Nov. 14 have been estimated by the American Petroleum Institute at 102,571 bbl. daily. This compares with the daily average of 262,857 bbl. for the week ended Nov. 7, and with 208,857 bbl. daily for the four weeks ended Nov. 14.

Crude runs to stills during the week are placed at 2,343,000 bbl. daily. Cracked gasoline produced during the week was placed at 3,474,000 bbl.

Stocks of gasoline at bulk terminals and in transit, east of California, for the week ended Nov. 14, totaled 13,525,000 gal., as compared with 12,966,000 gal. for the previous week, and with 12,247,000 gal. for the week ended Nov. 15, 1930.

M.E.A. Plans Banquet

NEW YORK, Nov. 18—Motor and Equipment Association will hold its annual trade show banquet in connection with the joint M.E.A. and N.S.P.A. Show at Atlantic City at Hotel Traymore, Thursday evening, Dec. 10, at 7 o'clock.

The event will be largely social, the talk of the evening being given by James E. Gheen, professional humorist. There will be additional entertainment features, after which there will be informal dancing.

Plane Output Reaches 2321

First Nine Months of 1931 Covered in Commerce Survey

WASHINGTON, Nov. 19—Airplanes manufactured in the United States during the first nine months of 1931 totaled 2321, according to a survey made by the Aeronautics Branch of the Department of Commerce and announced today. These craft included 1583 manufactured for domestic civil use, 637 military deliveries and 101 exported to foreign countries.

The airplanes built for domestic civil use included 1130 monoplanes, 399 biplanes, 52 autogiros and 2 helicopters. Of the monoplanes, the majority were landplanes of the one or two-place open-cockpit type, and of the biplanes, the majority were either two or three-place open-cockpit landplanes.

During the first nine months of 1930, a total of 2710 airplanes was manufactured, of which 945 were monoplanes and 987 biplanes. Of the total, 1956 were manufactured for domestic civil use; 556 were delivered to the Army and Navy, and 198 were exported.

The report for the nine months of 1931 is based on a record of Department of Commerce licenses, identification marks issued for unlicensed airplanes, and reports as to exports and military deliveries for aircraft manufactured between Jan. 1 and Sept. 30. There is a possibility, however, that there still may be a few aircraft manufactured within that period for which licenses or identification marks have not yet been sought.

Service Men Invited to Joint Show

NEW YORK, Nov. 16—Car dealers, service station operators, fleet owners, bus maintenance men, garage owners and others engaged in automotive service work will be invited to visit the joint N.S.P.A. and M.E.A. Trade Show in Atlantic City on Friday evening, Dec. 11. Admission will be by tickets which will be distributed through jobber members of the two associations, located within a radius of two hundred miles from Atlantic City.

Franklin Sales Improve

NEW YORK, Nov. 18—Franklin Automobile Co. reports that October was a real turning point in its sales and deliveries in a number of cities. Among the cities in which the upturn was noticeable are New York, Chicago, Boston, Philadelphia, Baltimore, Indianapolis, Washington, Albany, Buffalo, Syracuse, Cleveland, Columbus, Houston, New Orleans, Portland, Ore.; Los Angeles, and Salt Lake City.

Stewart-Warner Offers New Braking System For Passenger Cars and Commercial Units

PHILADELPHIA, Nov. 19—A complete power braking system for both passenger cars and commercial vehicles is now being offered the industry by the Stewart-Warner Corp. of Chicago. It comprises brake assemblies for the four wheels of the car, a power unit or servo device which is mounted on the rear of the transmission, a pedal for operating the power unit, and links or linkages connecting the pedal to the power unit and the emergency brake lever and the power unit to the individual brakes. Low pedal pressure, short pedal travel, and great linkage travel reserve are claimed to be advantages of the system, and together they are said to assure positive control of the car even at maximum speeds. The same four brakes that serve for all ordinary braking also serve for emergency braking or parking, the brake lever being connected with the general brake hook-up through a slotted link.

In operation, the brake pedal motivates a pressure plate in the power unit which is forced against a friction disk rotating on an extension of the transmission main shaft. As the disk is retarded it sets in rotation a threaded actuator, causing the latter to move forward on the shaft, this in turn operating the brake linkage. The power unit is so designed that it is equally effective for both forward and backward motion of the car. It is stated that the brake releases instantly when pressure is removed from the brake pedal. To assure smooth engagement, the disk of the power unit is so designed that it can yield elastically, and it is, moreover, lined with asbestos fabric and operates in oil.

Brake wheels of the system are of the simple two-shoe type. Each pair of shoes is actuated by a cam mounted on a floating camshaft, so that the pressure on the two shoes are completely equalized. The brake shoes are forged from rolled sections of high-carbon steel of special shape, with cam contact surfaces forged on as integral parts. The contact surfaces at both ends of the shoes are hardened. These contact surfaces are of such design that they will hold the cams accurately in position endwise. The opening of the backing plate through which the camshaft passes is closed by a metallic cover. Distribution of the force of application between the front and rear brakes is controlled by the lengths of the lever arms on the camshafts of the two sets of brakes respectively. This is claimed to result in maintenance of the original proportion, regardless of wear of the linings and of drum expansion due to heat.

With the arrangement of brake cams used, the front brakes are said to be released in proportion as the wheels are swung around from the straight-ahead position, thus preventing interference of the brakes with the proper

operation of the steering gear.

Adjustment of the brake is made by means of a stud with two tapered-channel slots into which fit the inclined ends of the forged shoes. Longitudinal movement of the stud effects adjustment of the shoes.

The Stewart-Warner power unit may also be applied to standard brake hook-ups. A complete illustrated description of these brakes will appear in an early issue of *Automotive Industries*.

Air Travel Increases

NEW YORK, Nov. 15—While 1931 passenger traffic on railroads and steamships is off from 18 to 44 per cent, as compared with 1930, American air transport lines showed a 6 per cent increase in passengers and a 47 per cent increase in mileage flown during the first nine months of 1931.

These comparisons can be made from a report issued today by the Aeronautical Chamber of Commerce of America, Inc., national trade association of the aircraft industry, covering operations on the 38 major air lines in the United States during the first nine months of 1931.

The air transport lines set a new record for passengers carried during the first nine months when 348,507 persons were carried as compared with 327,211 passengers in the corresponding period for 1930. This is an increase of 6.5 per cent despite generally depressed conditions.

Rubber Consumption Down

NEW YORK, Nov. 16—Consumption of crude rubber during October is placed by the Rubber Manufacturers Association at 22,277 long tons. This compares with 23,638 long tons in September and 27,516 long tons in October of 1930. Imports during the month were 41,395 long tons, as compared with 40,505 long tons in September. Domestic stocks as of Oct. 31 are estimated as 273,456 long tons, an increase of 7½ per cent over September and 47.4 over October last year.

Plymouth Stunt Attracts Londoners

Chrysler Motors Ltd. created the only sensation of the London automobile show by sending out two of the new Plymouths, only just introduced in England, in the streets in the vicinity of the Olympia Hall where the show is held, fitted throughout with stunt glass by which it was possible for the driver and his passengers to see out but impossible for those in the street to see in.

Pedestrians were amazed to see a car rushing through the streets apparently driverless. As far as is known, the police raised no objection.

The success of the stunt was made quite plain at the Chrysler Company's stand inside the Hall which was besieged all day throughout the show by would-be purchasers of the car with the mystery glass!

Chevrolet October Sales Reach 37,921 Units

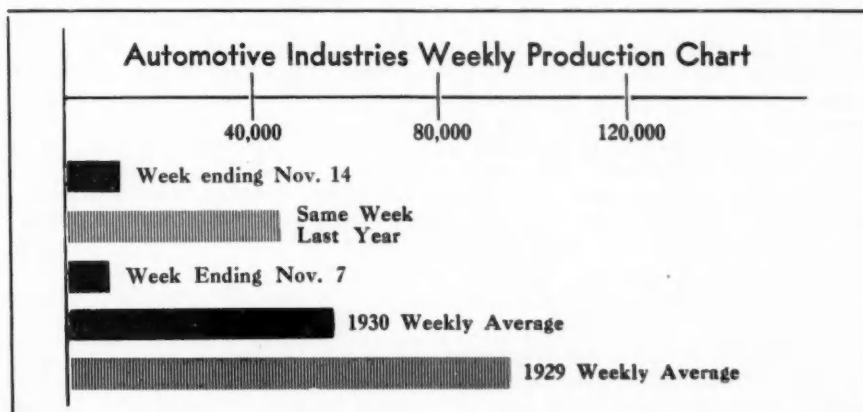
DETROIT, Nov. 17—Chevrolet Motor Co. has reported retail sales during October totaling 37,921 cars and trucks, according to H. J. Klingler, vice-president and general sales manager. This compares with 37,674 units in October, 1930, and with 38,685 units in September this year.

Chrysler Opens Parts Depot

ATLANTA, Nov. 17—The Chrysler Corp. has opened a parts depot in a building at 190 Walker St., containing 25,000 sq. ft., which has been leased for this purpose. Steel bins and other equipment will be installed in the new department, it was stated.

Bohn Declares Dividend

NEW YORK, Nov. 18—Bohn Aluminum & Brass Corp. has declared a dividend of 37½ cents, payable Jan. 2 to stockholders of record Dec. 15.



Vapor Lock Studies Continued; Engineering, Business News

Vapor Lock Studied

O. C. Bridgeman, H. S. White and F. B. Gary of the Bureau of Standards in a recent paper before the American Petroleum Institute state that a survey of fuel-line temperatures covering 47 out of 65 distinct 1931 models of passenger cars, indicates that the permissible gasoline vapor pressure for freedom from vapor lock is not lower with the average of these cars than with 1930 cars. Taking the temperature at the pump inlet as the critical value for mechanical-pump-feed systems, at the tank outlet for vacuum-feed systems and at the tank or sediment-bowl outlet for gravity systems, it is shown that the average temperature excess at these points over atmospheric temperature is 32 deg. Fahr. when running at a constant speed of 40 m.p.h., and 50 deg. Fahr. when idling. The permissible vapor pressure of gasoline (which is safe from the standpoint of vapor lock at an atmospheric temperature of 90 deg. Fahr.) is 9.5 lb. p. sq. in. for a constant speed of 40 m.p.h. and 7.2 lb. p. sq. in. for idling.

The authors state that on the basis of the available information, three of the most desirable changes in fuel systems design and installation are as follows:

1. Placing the fuel line from the rear tank to the pump outside of the frame channel to a point practically opposite the pump, so as to have a minimum length of tubing inside the engine compartment, and thermally insulating this latter portion of the line.
2. Removing the fuel pump from the crankcase and driving it, for example, from the end of the camshaft.
3. Using oil cups or similar devices to lubricate the pump rather than circulating large quantities of crankcase oil through the fuel pump shell.

Building Aircraft Diesel

The Bayerische Motoren Werke of Munich is building an aircraft Diesel engine in accordance with plans due to Franz Lang, inventor of the Acro engine. The engine, it is understood, is being built for an American aircraft manufacturing company.

The firm of Siemens & Halske, manufacturer of radial air-cooled aircraft engines, has had issued to it a British patent on a radial two-stroke Diesel aircraft engine, among the features being that the engine is scavenged and supercharged by means of a centrifugal blower mounted concentric with the crankshaft and driven from the later through gearing, and that a separate injection pump is provided for each cylinder, the various pumps being arranged radially and operated by a single cam which is on the camshaft.

Only Six U. S. Makers in London Truck Show

Out of a total of 58 makes exhibited at the 1931 Commercial Transport Exhibition held in London, only six are American.

The fact that goods vehicles driven by Diesel oil engines are playing a leading part in an automobile exposition for the first time has tended to concentrate interest and attention around this new development. Out of a total number of 399 exhibits there were 28 driven by oil engines. However, as few exhibitors show more than one oil-driven model, it may be taken that of the total 58 makes exhibited, nearly 20 offer the oil consuming unit as optional. No American exhibitor is showing this new development.

American exhibitors include the Dodge, Studebaker-Pierce-Arrow, Willys and Willys's British made truck, the Manchester, Reo, and General Motor's British made Chevrolet.

Naturally it has not been necessary to increase Chevrolet and Manchester prices, both being 100 per cent British; Reos are selling at the prices in force before the abandonment of the Gold Standard, which does not allow for cost of British distribution or for any profit; Studebaker and Dodge prices have been increased to cover the difference in exchange.

Quenching Solutions for Steel

A steel equivalent to or possibly better than the quenched and tempered steel would often be possible if quenching solutions were available possessing characteristic cooling rates between those of water and oil.

In a recent investigation at the Bureau of Standards a study was made of aqueous solutions of ethylene glycol, glycerine, and sodium silicate to determine whether any of them offered promise as quenching media with characteristic cooling rates in this intermediate range. It was found that the solutions of glycol and of glycerine did not give results which were readily reproducible. Hence, such solutions do not appear promising for practical use. However, solutions of several concentrations of sodium silicate proved to have quenching rates in the desired intermediate range and to give very consistent results. Some of these sodium silicate solutions must be treated with small additions of caustic soda in order to prevent changes in them when allowed to stand for several

months. The effect of varying the concentration and the temperature of the sodium silicate solution was studied. It was concluded that sodium silicate solutions give promise of usefulness in the quenching of steels by providing solutions having graded cooling rates between those of water and of oil.

A full report on this subject was published in the September number of the *Bureau of Standards Journal of Research*.

Gramm Making Trailers

DELPHOS, OHIO, Nov. 18—Gramm Motors, Inc., has established a trailer division within its organization to market its recently introduced line of semi-trailers. The new division will function independently of the truck division and will supply Gramm trailers to any truck or car dealer.

The present line consists of four models, as follows: Model DF-500, gross weight 8000 lb., to carry 3 to 4½ tons; Model DF-1000, gross weight, 12,000 lb., to carry 5 to 7½ tons; Model DF-1500, gross weight 18,000 lb., to carry 7½ to 12 tons, and Model DF-2000, gross weight 24,000 lb., to carry 10 to 18 tons.

Frame width is 34 in. for all models. Outriggers are riveted to the front section. Springs are chrome-vanadium and equipped with auxiliaries. The axle is of Timken design. Cast spoke wheels are used, equipped with dual rims. Brake equipment can be furnished if desired. The dolly support is of seamless steel tubing construction, hinged at front and hand operated.

The upper fifth wheel is a Martin semi-automatic type, attachable to a Fruehauf, Highway or G.M.C. lower fifth wheel. A Martin lower fifth wheel is supplied at extra cost. It locks automatically when coupled but requires pull on lever to uncouple. The Kingham wheel is also furnished.

Constituents of Petroleum

An investigation on the separation, identification and determination of constituents of petroleum, carried out at the Bureau of Standards by E. W. Washburn as one of the fundamental research projects of the American Petroleum Institute, in which a Northern Oklahoma petroleum was used as an average grade, revealed that the straight-chain paraffin hydrocarbons form a surprisingly small quantity in the naphtha fraction, although it has been generally believed that a naphtha as paraffinic as this consisted principally of this class of compounds. All but one of the branched-chain hexanes were found to be present, and the petroleum contained nearly as much of the aromatic hydrocarbon toluene (the basis of TNT) as of normal hexane.

Position of Automotive Securities Listed on the New York Stock Exchange as of November 1, 1931

(November Bulletin of the New York Stock Exchange)

NAME OF GROUP	No. of Companies	No. of Issues	COMMON STOCKS			No. of Issues	PREFERRED STOCKS			ALL STOCKS			
			Average Price	Total Shares Listed	Total Market Value		Average Price	Total Shares Listed	Total Market Value	No. of Issues	Average Price	Total Shares Listed	Total Market Value
Automobile & Truck Mfg. Co.'s (and Holding Co.'s)	23	23	\$17.55	83,740,269	\$1,469,496,801	7	\$77.23	2,364,475	\$182,609,634	30	\$19.19	86,104,744	\$1,652,106,435
Automobile Access. Mfg. Co.'s (and Holding Co.'s)	35	35	9.97	22,257,231	221,971,798	5	32.49	297,409	9,603,933	40	10.27	22,554,640	231,635,731
AUTOMOBILE INDUSTRY	58	58	15.96	105,997,500	1,691,468,599	12	72.23	2,661,884	192,273,567	70	17.34	108,659,384	1,883,742,166
AIRPLANES-A'WAYS-A'PORTS. TOTAL	9	9	6.45	16,475,161	106,306,378	2	10.29	1,380,433	14,198,745	11	6.75	17,855,594	120,505,123
FARM MACHINERY INDUSTRY. TOTAL	7	7	22.07	8,086,516	178,445,039	5	45.41	3,141,509	142,671,163	11	28.60	11,228,025	321,116,202
Petroleum & Natural Gas Co.'s	42	44	15.97	168,874,291	2,696,994,895	12	37.39	2,215,962	82,844,347	56	16.25	171,090,253	2,779,839,242
Petroleum & Natural Gas Holding Co.'s	3	3	6.50	3,505,960	22,779,086	5	.....	.....	.....	3	6.50	3,505,960	22,779,086
PETROLEUM INDUSTRY	45	47	15.78	172,380,251	2,719,773,981	12	37.39	2,215,962	82,844,347	59	16.05	174,596,213	2,802,618,328
RUBBER TIRE & GOODS INDUS- TRY	8	8	9.05	9,621,826	87,117,079	10	36.11	2,661,343	96,097,315	18	14.92	12,283,169	183,214,394
Omnibus Operating Co.'s	3	3	6.90	1,085,215	7,492,064	1	60.50	88,782	5,371,311	4	10.96	1,173,997	12,863,375

The German Market

Special Correspondence

Development of the domestic car market in Germany has been so slowed down by the present difficulties that German motor manufacturers are making a desperate attempt to increase their exports. Many are suspected of offering their cars in foreign markets below the domestic prices.

The following table illustrates the slowing down of motor buying in the domestic market. Taking the increase of passenger car registrations between 1926 and 1927 (actually 61,287) to equal 100, we get:

1927-28. 136.4	1929-30. 111.0
1928-29. 133.5	1930-31. 35.4

The decline in passenger car sales during the first six months of 1931 amounted to 30 per cent as compared with the same period of 1930; commercial vehicle sales dropped 14 per cent, making a total decline of 27.5 per cent. This decline is partly offset by 14.5 per cent increase in the number of second-hand sales, showing that a substantial replacement demand is piling up and is likely to be affected the moment general conditions improve.

Although the proportion of total production exported has improved during the present year it is far behind the quota exported in the years before the War. In 1931, 7862 passenger cars were exported, representing 40 per cent of the total production for that year. Both the unit and the percentage figures have since dropped heavily. In 1929 passenger car exports numbered 4809; in 1930 3898. During the first six months of 1931 the percentage of passenger cars exported has risen to 9.6 (compared with 4.6 in 1930) and of commercial vehicles to 15 per cent (compared with 12.5 in 1930).

The German motor industry's best foreign markets are her neighbors. Switzerland takes about 20 per cent of the exports, followed by Belgium, Denmark, Czecho-Slovakia.

Deeds Goes to Europe

Colonel Edward A. Deeds, chairman of the executive committee of United Aircraft & Transport Corporation, sailed last week aboard the S. S. Ile de France for a trip to Europe. He was accompanied by Mrs. Deeds.

Automotive Industries

Offers Automobile Radio

NEW YORK, Nov. 16—A. Atwater Kent has developed a new automobile radio which has been thoroughly tested before introduction on the market. The set has illuminated remote control which clamps on the steering column, the set itself being bolted from the underside of the floorboard and the speaker mounted usually under the cowl. The antenna can be easily installed under the car top or the running board.

Armstrong Addresses Massachusetts Truckers

NEW YORK, Nov. 16—Claims that motor trucks enjoy unfair competitive advantages over the railroads are not supportable, R. S. Armstrong, secretary of the Motor Vehicle Conference Committee, said in speaking before the Motor Transport Associates of the Springfield, Mass., Chamber of Commerce last week.

Mr. Armstrong quoted figures showing 27 per cent of the aggregate automobile tax revenue was derived from motor trucks, although these comprise only 13 per cent of the total registration, and advocated a careful scrutiny of all proposed registration affecting the automotive industry or the privileges and benefits of highway transportation shipments will be materially curtailed.

A. D. Williams

NEW YORK, Nov. 17—A. D. Williams, a sales executive of the American Chain Co., died Nov. 13, in Bridgeport, Conn., following an operation for appendicitis. Mr. Williams was one of the first salesmen to sell the Weed chain. He joined the old Weed Chain Tire Grip Co., in 1910, later resigning to join the "X" Laboratories as sales manager. In 1924 he left this connection to join the American Chain Co., which in the meantime had absorbed the Weed organization.

Peerless Continues Lines

CLEVELAND, Nov. 17—Few changes will be made in the Peerless line for 1932, it has been reported here. The standard eight is no longer in production, but the de luxe and custom series of passenger cars will be continued into 1932, with the addition of free wheeling.

The Citroen Plan

Special Correspondence

That Andre Citroen's plan for rationalizing the world motor export trade would not be acceptable to the main body of European motor manufacturers is made clear by an article in the *Manchester Guardian Commercial* (England).

Citroen's plan for quotas based on 1930 export figures would not do justice to the European industry, which, according to statistics, is expanding at the expense of North American manufacturers.

The writer quotes the North American share as retracting from 83.6 per cent in 1929 to 76.2 in 1930. Great Britain, France and Italy have together increased their share from 15 per cent in 1929 to 22 per cent in 1930. The share of Britain alone increased from 5.5 per cent in 1929 to 8 per cent in 1930, and is expected to reach over 10 per cent in 1931.

Little indeed can be found in favor of the scheme here in England, and the British Empire could scarcely be expected to agree to a monopoly in which the Mother Country had no share.

Again, markets like Scandinavia, which are in fact the property of the American motor manufacturers, would never agree to admitting such a monopoly by name and contract.

All that the scheme is likely to produce is a renewal of the project for a European cartel designed to exclude North American exports to the European markets—which amounted in 1929 to 151,278 and in 1930 to 89,961.

Maryland Inspects Vehicles

BALTIMORE, Nov. 17—Defective lights lead among the faults found in inspections made in the Maryland save-a-life campaign now being conducted. Although only 82,317 reports are available at present, it is shown that it was necessary to adjust or replace the lights on 29,049 motor cars. Faulty brakes were found in 19,320 instances.

McCann's Designing 750-Gal. Pumper

NEW YORK, Nov. 16—D. E. McCann's Sons of Portland, Maine, are designing a new 750 gallon pumper.

November 21, 1931

Ford Distribution in Italy at Standstill; Plans to Meet Situation Are Stalemated

Special Correspondence

The imposition of an all-round 15 per cent tariff, designed as an obstacle to British manufacturers who might take advantage of the devaluation of the pound and make a special attack on the Italian market, has brought the distribution of Ford cars in Italy to a standstill.

Ford units for the Italian market are imported from Detroit via Barcelona; it will therefore not be until the new Ford factory at Dagenham, England, is in production (some time in the first half of 1932) that the difficulties of the Italian subsidiary are likely to be overcome.

Even before the imposition of the new 15 per cent duty, Ford was already laboring under a practically crushing tariff burden. The Ford Tudor sedan was imported from Barcelona priced lire 11,600 (\$630); duties, assessed chiefly according to weight, amounted to lire 15,820 (\$860); the total of lire 27,420 (\$1,490) was then increased by the retailer's commission amounting to anything up to 20 per cent, the final

selling price being anything up to lire 32,900 (\$1,748). The comparable Fiat model sells at lire 19,250 (\$1,045).

Ford Italiana S/A is a subsidiary of Ford Motor Co., Ltd. (England). According to the articles under which the English company was incorporated, 40 per cent of the shares in each of the continental companies was to be offered to the public in the country of incorporation. No such issue has yet been made in respect of Ford Italiana S/A nor is any such issue imminent.

However, negotiations have been carried on for the past year between Ford and the Isotta Fraschini Company, the result of which was a scheme whereby Isotta Fraschini would manufacture the Ford car for Italy in their Milan factory, and whereby Ford would participate (probably to the extent of 49 per cent—\$5,000,000) in the reorganization of the Isotta Fraschini capital. This scheme has now been temporarily abandoned, economic conditions in Italy being hardly encouraging.

Weymann Using Aluminum Panels

INDIANAPOLIS, Nov. 16—At the solicitation of the Stutz Motor Car Co. and several other customers, the American Weymann Co. some time ago built a body with aluminum panels attached to the same type of framework as used in the regular Weymann fabric bodies. The first of these bodies was fitted to the car driven by Cannonball (Eddie) Baker in his record run across the Continent, and as it met all requirements and held up well, several experimental jobs were put through the shop. These were of the Weymann Monte Carlo line. It is understood that Stutz cars equipped with these bodies met with a favorable reception on the part of the public, and Stutz therefore ordered these bodies as optional equipment for its 1932 line. Except for the paneling, which is of aluminum sheet, the specifications are practically the same as for the Weymann fabric bodies. The weight, of course, is somewhat greater than that of corresponding fabric bodies, but the bodies also are stronger.

Baltimore Plans Show

BALTIMORE, Nov. 17—Baltimore's 1932 automobile show, under the auspices of the Automobile Trade Association of Maryland, will be held at the Fifth Regiment Armory from Jan. 23 to 30. The committee in charge of the arrangements has been named. It is composed of A. H. Bishop, E. T. Backus, Herbert Hartman, Walter F. Kneip, Joseph R.

Manuel, William P. Norfolk, C. Harry Reeves, Thomas W. Wilson, A. Stanley Zell and Thomas G. Young. John E. Raine, general manager of the association, is manager of the show.

Grant Predicts Sales of 2,000,000 in 1932

CHICAGO, Nov. 16—A gradual restoration of business confidence is under way and 1932 will see the replacement of a large percentage of the 2,000,000 motor cars that have been junked in the past two years, R. H. Grant, vice-president, General Motors Corp., told more than 1000 Buick dealers and their salesman at a dinner in the Palmer House, preceding the showing of new Buick models here.

Mr. Grant predicted sale of 2,000,000 automobiles in 1932 and said General Motors expected to sell 45 per cent of them. He cited the record of the corporation in 1931, when it sold 42 per cent of the cars.

S. S. Lindsey, Chicago zone manager, acted as toastmaster and others at the speakers table were: E. T. Strong, president and general manager, Buick Motor Co.; C. W. Churchill, general sales manager, Buick Motor Co.; George H. Wallace, assistant sales manager, and W. F. Hufstader, district sales manager.

Yale Tire Co. Purchased

NEW YORK, Nov. 16—General Tire and Rubber Company has purchased the Yale Tire and Rubber Company of New Haven, Conn., and will transfer its activities to Akron.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Passenger Car Show, Glasgow..Nov. 13-21
Salon, New York City.....Nov. 29-Dec. 5
Motorcycle Show, London..Nov. 30-Dec. 5
National Automobile, New York..Jan. 9-16
San Francisco, Automobile.....Jan. 9-16
Newark, N. J., Automobile.....Jan. 16-23
Cincinnati, Automobile.....Jan. 17-23
Milwaukee, Wis., Automobile...Jan. 17-23
Philadelphia, Automobile.....Jan. 18-23
Louisville, Ky., Automobile....Jan. 18-23
Omaha, Neb., Automobile.....Jan. 18-23
Boston, Mass., Automobile.....Jan. 23-30
Minneapolis, Minn., Automobile..Jan. 23-30
Hartford, Conn., Automobile...Jan. 23-30
Detroit, Automobile.....Jan. 23-30
Montreal, Automobile.....Jan. 23-30
Baltimore, Automobile.....Jan. 23-30
Pittsburgh, Pa., Automobile....Jan. 23-30
St. Petersburg, Fla., Automobile, Jan. 27-29
National Automobile, Chicago, Jan. 30-Feb. 6
Salon, Chicago.....Jan. 30-Feb. 6
Washington, D. C., Automobile Jan. 30-Feb. 6
Cleveland, Automobile....Jan. 30-Feb. 6
Springfield, Ill., Automobile....Feb. 4-6
St. Paul, Automobile.....Feb. 6-13
St. Louis, Automobile.....Feb. 7-12
Denver, Colo., Automobile.....Feb. 8-13
Peoria, Ill., Automobile.....Feb. 9-14
Salon, Los Angeles, Calif.....Feb. 13-20
Kansas City, Automobile.....Feb. 13-20
Mankato, Minn., Automobile...Feb. 17-20
Holyoke, Mass., Automobile...Feb. 18-22
Des Moines, Iowa, Automobile..Feb. 21-26
Wichita, Kans., Tractor and Power Equipment.....Feb. 23-26
Salon, San Francisco, Calif..Feb. 27-Mar. 5

CONVENTIONS

American Society Mechanical Engineers—Annual meeting, New York City.....Nov. 30-Dec. 4
American Roadbuilders Association, Detroit, Mich.Jan. 11-14, 1932
S.A.E. Annual Dinner, New York City, Jan. 14
S.A.E. Annual Meeting, Detroit, Mich., Jan. 25-29

S.A.E. SECTION MEETINGS

Indiana (Indianapolis).....Nov. 17
Metropolitan (New York City)...Nov. 19
Detroit (Student Activity).....Nov. 24

Plymouth Position Gains

DETROIT, Nov. 16—Plymouth's percentage of all low-cost cars sold in September increased 2.6 per cent over the preceding month, according to H. G. Moock, general sales manager of Plymouth Motor Corp.

In August, Plymouth sold 18.8 per cent of all the low-cost cars sold. In September, Plymouth sold 21.4 per cent of this total. In making this computation the comparative figure included Ford, Chevrolet and Plymouth. This figure compares with 5.1 per cent of total low-cost cars sold in August, 1930, and with 5.3 per cent in September a year ago.

A. E. C. High-Speed Oil Engine Has Spherical Combustion Chamber

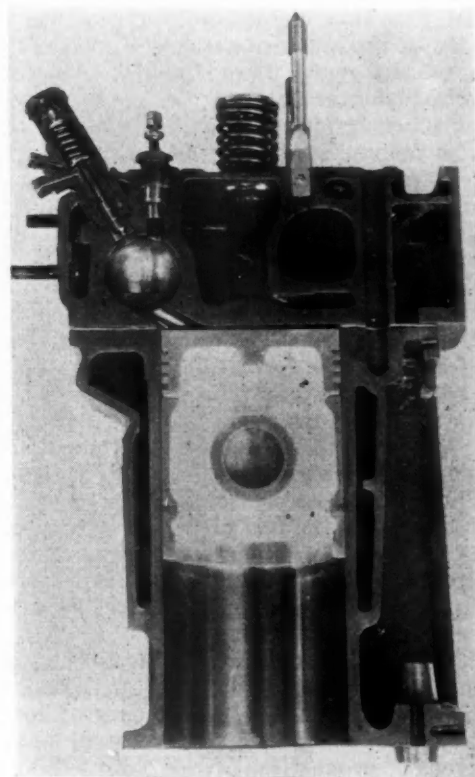
by M. W. Bourdon

IN *Automotive Industries* of Dec. 13, 1930, there appeared an illustrated description of the high-speed oil engine that had just been put in production by the Associated Equipment Co. of Southall, Middlesex, England. In a new series of this engine, as the result of collaboration between A.E.C. engineers and H. R. Ricardo, the form of the compression space has been considerably changed. As shown in the accompanying sectional view, there is now a spherical precombustion chamber, and the fuel is injected into this chamber at a point opposite the passage through which it communicates with the cylinder, instead of through this passage.

Originally the engine, with a bore and stroke of 110 x 142 mm., developed 95 b.hp. under normal conditions of fuel delivery at 2500 r.p.m. The new design, with a bore of 115 mm., develops 130 b.hp. at 2200 r.p.m. and 140 b.hp. at 2500 r.p.m. It weighs only 1414 lb. complete, thus giving a ratio of 10 lb. per hp. The b.m.e.p. is 100 lb. per sq. in. and upwards over a speed range of from 600 to 1500 r.p.m. It is claimed that "Diesel knock" has been practically eliminated, and that, as the new combustion chamber shape produces a greater and more definite state of turbulence of the air before fuel injection, cleaner combustion is secured and a higher mean effective pressure at a lower fuel consumption.

The new cylinder head has the spherical combustion chamber offset in relation to the cylinder bore and is connected to the latter by a slightly conical throat arranged tangentially to the surface of the combustion chamber. As much as possible of the compression volume is contained in the sphere.

The idea underlying the design is to produce an orderly swirl of the air in the combustion chamber. On being forced from the cylinder through the tangential throat during the compression period, the air



Section through cylinder of new A.E.C. oil engine + + +

has a rotary movement within the sphere, and the body of the air, thus flowing at a high rate past the injector nozzle during injection, brings a continuous supply of fresh air to each particle of fuel as it enters the combustion chamber. As a result, it is claimed, a higher percentage of the air is utilized, thus raising the mean effective pressure.

Automotive Men and Companies in Unemployment Relief

(Continued from page 791)

\$8,875; Fisher Body Corp., \$5,265; Ford Motor Co., \$13,569; Hupp Motor Car Corp., \$3,692; Lincoln Motor Co., \$1,086; Packard Motor Car Co., \$9,557.

Alexander Legge, president of International Harvester, is heading the one central group which will administer all unemployment relief in the state of Illinois. R. G. Tiffany, president of the Chicago Automobile Trade Association, is leading a divisional group which is raising relief funds from the automobile and

accessory field in the Chicago area, while among the 315 leaders named by Governor Emerson to engage actively in the work of raising relief funds throughout the state are found John H. Merrill, vice-president, rubber division, Raybestos-Manhattan Corp.; William L. O'Connell, president, O'Connell Motor Truck Co.; Fred A. Preston, vice-president, Canton Forge & Axle Co.; Clement Studebaker, Studebaker Corp.; Lawrence M. Viles, president, Buda Co.

The Influence of Bores on the Fatigue Tensile Strength of Steel Bars

Der Einfluss von Bohrungen auf die Dauerzugfestigkeit von Stahlstäben. By Dr. G. Barner. Berlin, 1931, VDI-Verlag, publishers. 50 pages, with 60 illustrations and 19 tables. Paper cover, RM 5, 50 (VDI-members RM 5 —).

No problem in machine building requires attention more urgently than that of permissible stresses in materials. Though the classic theory of the strength of materials forms the basis of calculation for designers, still it is obviously inadequate in view of the fact that it does not permit of correct computation of the stresses actually obtained in practice.

Of late years, there has developed a growing trend toward better data for design by using the "endurance" or fatigue strength of a material as the basis. The fatigue strength was assumed as being a physical value dependent solely upon the material. It soon appeared, however, that the form and surface finish of the test bodies exercised a decisive influence upon the magnitude of the fatigue strength.

This phenomenon, in the shape of the notch effect or surface sensitiveness, is investigated in Dr. Barner's treatise. The first section contains a review of important information on the notch effect, as far as it had been determined from the theory of elasticity and from practical tests.

In the main section, a report is made on fatigue tensile tests on an Amsler pulsator testing machine. The problem to be solved was to ascertain the influence upon the test piece, of rolling skin, bores, and finish of bores, under frequent reversal of a tensile stress load. The materials tested comprised soft ingot steel, hard ingot steel, and low-alloy structural steel.

The results obtained varied widely, and are in marked opposition to views still generally accepted today. For instance, bored bars of soft ingot steel, though much inferior to hard steel as to their static strength properties, proved fully equal to the latter in point of fatigue strength, and even superior in other respects. On the other hand, the alloy structural steel shows a relatively low fatigue strength, due to the presence of the rolling skin.

By reason of the manner in which the tests were carried out, it was possible to obtain interesting glimpses into the behavior of the materials during the fatigue tests, such as the character and spread of fatigue cracks, the transition of the characteristics of the static tensile test to those of the fatigue tensile test, and others.

Practical engineering must insist on design data permitting increasing safety in construction combined with the best conceivable utilization of construction materials. With the publication of the present work, a substantial step has been taken in providing information answering these demands.

Siegfried Marcus

SOME information concerning the career of Siegfried Marcus, one of the pioneers of the automobile, is given in *Automobiltechnische Zeitschrift* on the occasion of the hundredth anniversary of his birth. Marcus was born in Malchow, Mecklenburg, Germany, but became an Austrian citizen and resided in Vienna. He built his first gasoline automobile in 1864, and the machine covered a distance of about 200 yards the following year. In this first gasoline automobile a single-cylinder, two-stroke cycle en-

gine was mounted vertically over the driving axle, which latter was developed in crankshaft form. The absence of a transmission and of a friction clutch and the great weight of the two-stroke engine were the reasons this vehicle was unsuitable to road traffic. Marcus recognized these defects and built a second vehicle, which he completed in 1875. This had a single-cylinder, horizontal, four-stroke engine of about 4½-in. bore and 10-in. stroke, rated at 1½ hp. This second vehicle incorporated some of the features common in automobiles today, such as electric ignition, a carburetor, worm-and-wheel steering, etc. Marcus made numerous extended trips in this vehicle, but the opposition of the Vienna police, who forbade the use of the vehicle in the streets of the city on account of its noisiness, put an end to the efforts of the inventor. He died in Vienna in 1898. The Marcus automobile is now in the Technical Museum in Vienna. It is to the credit of Marcus to have recognized in gasoline the most suitable fuel for motor road vehicles. He had to import the fluid from Germany and to pay for it at the rate of \$2.70 per gallon.

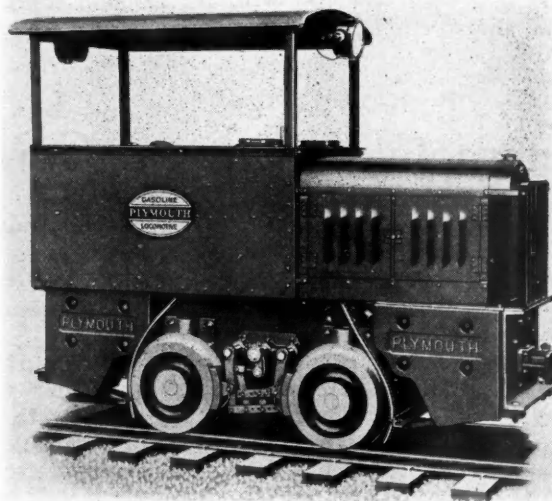
Plymouth Industrial Gasoline Locomotive

TO meet the requirements of those having a light-haulage problem, a new model gasoline locomotive equipped with Ford engine and four-speed truck transmission, has been announced by The Fate-Root-Heath Co. (Plymouth Locomotive Works), Plymouth, Ohio.

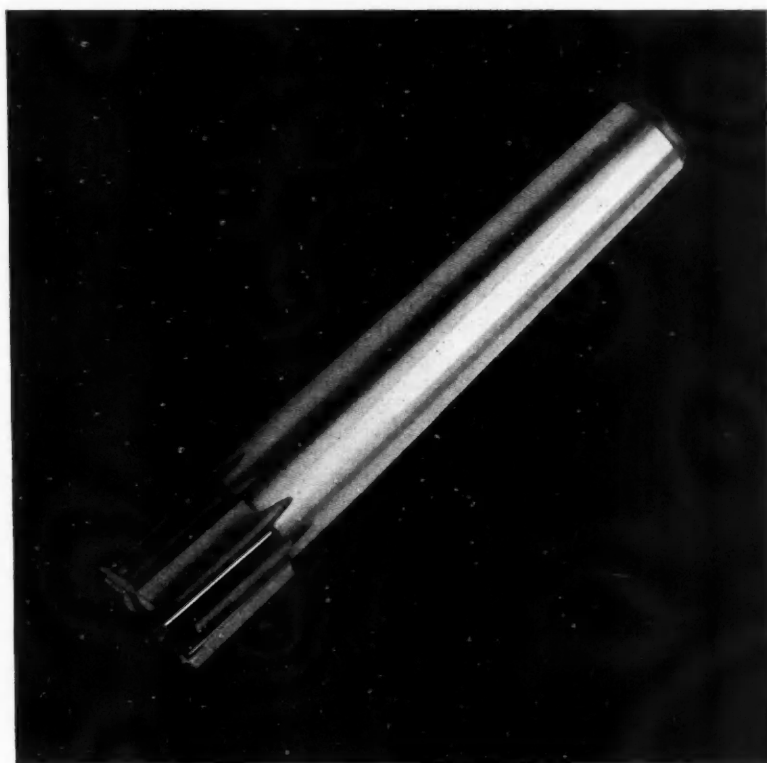
It is built in four weights—2½, 3, 3½ and 4 tons—on a short wheelbase to enable it to negotiate sharp curves, and is intended to meet the needs of contractors, quarries, sand, gravel and clay plants and general industrial plants.

A Plymouth reversing transmission, connected by a shaft and universal joints to the Ford four-speed truck transmission, provides four speeds in both directions.

The side frames, bumpers and cross supports are of heavy structural and bar steel, well braced and rigidly riveted and welded together, making a very strong frame. The cab is roomy, and gives clear vision in all directions. The standard equipment includes an electric starter, a generator, headlights, a horn and an oil-moistened air cleaner.



BARBER-COLMAN



ACCURATE TO A "TENTH"

Few tools are more accurately made than Barber-Colman Jig-Boring Reamers. Their precision is measurable in tenths of thousandths of an inch. Naturally, they excel for extremely close work . . . Made from one piece of high speed steel, their shanks are finish ground between lapped centers to eliminate run-out. Cutting edges are sharpened on the Barber-Colman Reamer Sharpening Machine, explaining the accuracy possible on the diameters of these reamers. A deep counterbore permits of many resharpenings on the end teeth. We carry these reamers in stock in a wide range of sizes. When ordering, be sure to specify exact size in tenths of thousandths of an inch.



BARBER-COLMAN COMPANY

General Offices and Plant

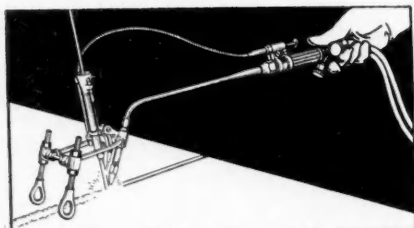
ROCKFORD, ILLINOIS, U. S. A.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Oxweld W-21 Lindewelder

Greater speed and economy are promised with the Oxweld W-21 Lindewelder, the latest development of the Linde Air Products Co. This welding unit is intended for use with Oxweld No. 24 rod possessing special high strength. This welding head utilizes two flames, one for preheating the welding rod, the other for welding. The upper or preheating flame is so



adjusted that the inner cone impinges directly upon the rod, preheating it practically to the melting point. Consequently little heat is required from the welding flame to melt the rod. The welding flame is directed between the vee and the rod so that the welding rod is melted and simultaneously fused with the base metal.

The carriage which supports the blowpipe during the welding operation can be adjusted to maintain the proper position for welding on flat plate or on all sizes of pipe from 4 in. upward. The two carriage runners straddle the weld directly behind the welding puddle. They can be adjusted in length, making it possible to maintain the proper position for all types of work. The Lindewelder can be used with five sizes of welding heads ranging from No. 9 to No. 13 inclusive. Detachable tips are furnished for preheating in sizes corresponding to the size of welding head being used.

Rod holders are furnished for $\frac{3}{8}$ -in., $\frac{5}{16}$ -in. and $\frac{1}{4}$ -in. welding rod. The holder is controlled by a trigger on the blowpipe handle which permits the operator to raise and lower the welding rod at will.

New Spiral Two-lipped End Mills, Straight Shank

A line of spiral two-lipped end mills, straight shank, has recently been announced by the Brown & Sharpe Mfg. Co., Providence, R. I. These end mills with spiral teeth, having greater cutting areas, are very desirable for certain types of operations and should

increase the cutting efficiency of the end mill. They are furnished in high-speed steel, both right and left-hand, and are made in a complete range of sizes.

Barber-Colman Hobbing Machine

Extending the principles of design which characterized the No. 12 hobbing machine, the Barber-Colman Co., Rockford, Ill., has just brought out the type A hobber with greater capacity and increased accuracy due to added ruggedness. This machine has a capacity of 12-in. diameter and 12-in. face. Diametral pitch in cast iron, 3; in steel, 4. Accuracy in spacing and tooth form, so essential in automotive work, are said to be a feature of the new design. The machine is also recommended for spline shaft work, particularly on long shafts.

The machine is equipped with an automatic "stabilizer" built into the bed and arranged to give a steady frictional drag or resistance to the hob swivel slide so that the hob will move steadily forward without jump or chatter. The stabilizer may be disconnected when desired by pulling out a small knob on the front of the bed casting. This off-and-on control is especially useful when it is desired

to traverse the hob swivel slide by hand, as when setting up new jobs. It is really a braking device for creating a drag on the hob swivel slide, eliminating backlash in the feed screw and preventing the slide from jumping when the hob chatters in the work.

Range of feed per revolution of work is 0.015 to 0.150 in. Eight hob speeds are available from 45 to 220 r.p.m. The built-in motor is of 5 hp. capacity, 1750 r.p.m. Net weight 5635 lb. approximately; floor space 60 x 100 in.

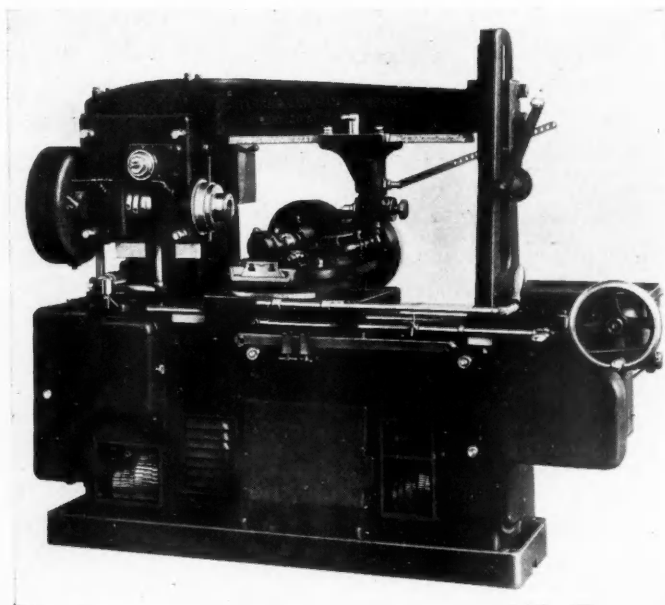
Automatic Cut-Off for Roll-forming Machines

A new automatic cut-off feature for roll-forming machines which may be either built into the machine or supplied as a separate unit has been introduced by the McKinney Tool & Mfg. Co., Cleveland, Ohio. The device works automatically making it possible to cut the molding or section to any desired length at the same speed it is being formed, without stopping the machine or altering its speed. Supplied in two different types, the McKinney cut-off feature is said to meet almost every existing condition.

One type is designed for cutting the stock in the flat before it enters the forming rolls. This type of machine consists of a flying shear working with an automatic trip, which cuts the material as it passes through a series of pinch rolls before entering the forming rolls. The other type is located at the exit end of the roll-forming machine.

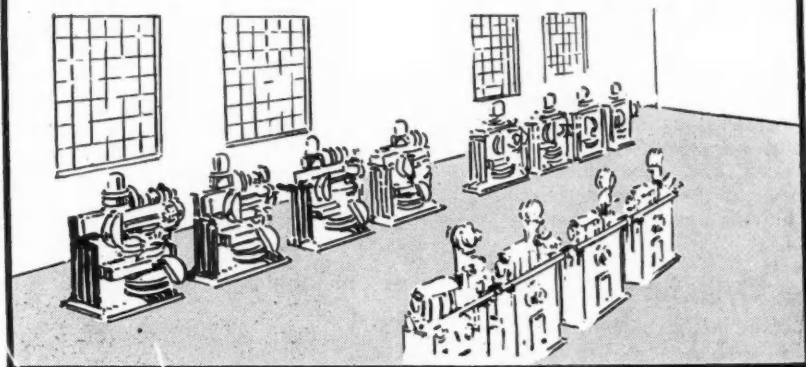
These automatic cut-off devices can be provided for attaching to many roll-forming machines other than those made by the McKinney Tool & Mfg. Co. This is not possible in every case,

(Turn to page 822, please)



Barber-Colman Hobbing Machine

..... and think of the burden in fixed charges on the investment in housing your gear production when you might



Old Gear Cutting Equipment VS. Modern High-Speed Gear Shapers

Can You Afford NOT to Modernize Your Gear Department?

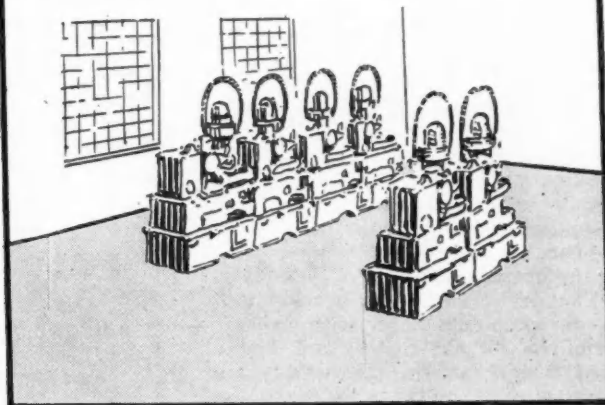
There are so many chances to profit, and so many ways for profits to leak away! Is there any question but that the modernized shop can manufacture its product to outsell those not so well equipped? Can you afford NOT to replace methods or machines (or both) which are a drag on manufacturing economy?

The money it will cost to re-equip cannot earn as much anywhere else. And it's better strategy and a wiser investment to have efficient tools installed and ready for business on the next rise, than to temporize and suddenly find yourself unable to meet competition.

Talk it over with a Fellows Sales Engineer NOW. Write, wire or phone either office:

THE FELLOWS GEAR SHAPER COMPANY, 78 River Street, Springfield, Vermont, or (616 Fisher Building, Detroit, Michigan).

... re-equip with more modern machine tools and save 25% of the space



FELLOWS

~ GEAR SHAPERS ~

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

however, as some makes of roll-forming machines are not adapted to attaching an automatic cut-off device. All important features are covered by patents or patent applications.

In conjunction with the roll-forming machines and the cut-off attachment the McKinney company has also introduced a new cradle reel. This is attached at the entrance end of the machine and carries the coil so that the steel is always in the proper shape and form to enter the rolls correctly. This reel is designed so that while one coil is running through the machine, a second coil may be mounted in the machine and be ready to enter as quickly as the other coil is completely run.

Burgess Ignition Booster

An ignition booster which has the effect of increasing the maximum voltage available at the gap of a spark plug to break down its dielectric resistance, and thus to add to the certainty of ignition in cases of weak battery, weak coil, or the presence of resistor suppressors in the ignition circuit to prevent interference with reception when a radio is installed in the car, has been placed on the market by the Burgess Battery Co., New York.

The device comprises a relay unit in an aluminum case, with exposed terminals for the connections, and a six-volt dry battery. Both units are mounted close together near the engine ignition coil. Connections are made with the dead side of the starting switch and with the primary circuit of the ignition coil.

In operation, the ignition booster automatically connects the six-volt dry battery in series with the storage battery of the car, thus impressing an

moment the foot is removed from the starting switch the relay throws out the dry battery, so that the engine operates on the storage battery alone. It is claimed that, since there is only a momentary drain on the dry battery, it lasts for six months or more.

Moline Cylinder Borer

It is interesting to learn that the Moline Tool Co., Moline, Ill., has supplied equipment used in producing the new 12-cylinder engine recently announced by American-LaFrance & Foamite Corp.

The machine shown here is a special inclined cylinder borer designed for rough boring, finish boring, reaming, and counterboring 8, 12 and 16-cylinder blocks. It takes every other hole at one setting, indexing for the alter-



nate holes. The nature of the operation may be judged from the fact that the 12-cylinder block weighs 568 lb., while the bore is 4.250 in. and the counterbore 4.260 in.

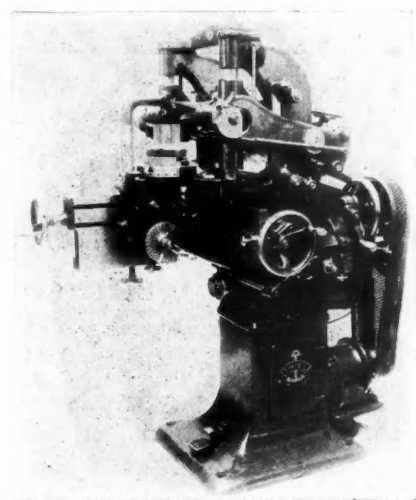
A feature of the installation is the turntable at the right which enables the operator to reload into the jig for boring the second row of holes. One of the outstanding characteristics of this machine is the fact that through the massiveness of the heads carrying the boring spindles it is not necessary to pilot the boring bar either above or below the work. The feed is adjustable through oilgear installation. Three changes of spindle speed are provided with pick-off change

gears, giving 60 ft. per min. for roughing and semi-finishing, 25 ft. per min. for counterboring, and a third speed of 45 ft. per min. as an intermediate.

The entire stroke, or travel, of the rail is 24 in. Both the spindles and the oilgear unit are driven by a 30 hp., 1800 r.p.m. motor through silent chain drive. The machine weighs approximately 30,000 lb. and the overall height is 10 ft.

Type 32 Thiel Vertical Punch and Form Shaper

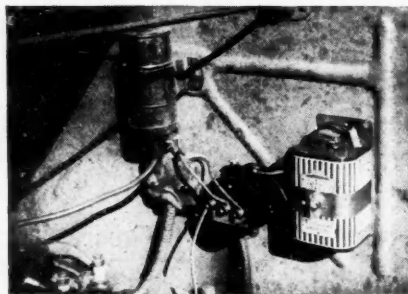
In addition to their line of precision sawing and filing machines for making dies and similar tools, Marburg Bros., Inc., 90 West Street, New York, have



just introduced another tool which promises a considerable saving in time in the manufacture of irregularly shaped punches or similar work.

The vertical punch and form shaper shown is novel in design. An ordinary cutting tool is used to produce one-piece solid punches quickly and accurately. The cutting tool after completing its downward travel swings back and thus produces the supporting shoulder for the punch. The radius is predetermined, with a minimum of $\frac{1}{2}$ in. A quick-change gearbox provides three speeds, according to type of material, degree of finish or length of stroke. The latter can be regulated from $1\frac{1}{2}$ in. to 4 in. The power cross feed has a maximum travel of about $8\frac{1}{4}$ in. and is adjustable from 0.006 to 0.017 in. in either direction. A dividing head with a milling machine type index plate permits the accurate shaping of arcs. All adjustments are easily made from the right-hand side of the shaper. Gages for the correct grinding and setting of the cutting tool are furnished with the machine. Starting and stopping pedals within easy reach of the operator connect with a friction clutch.

Power required is 1 hp. at 940 r.p.m.



increased voltage on the ignition coil at the moment of starting. The relay unit, actuated by the starting motor circuit, throws in the dry battery. The